THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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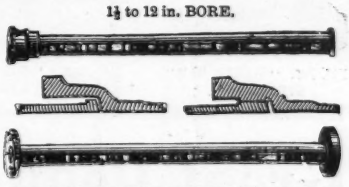

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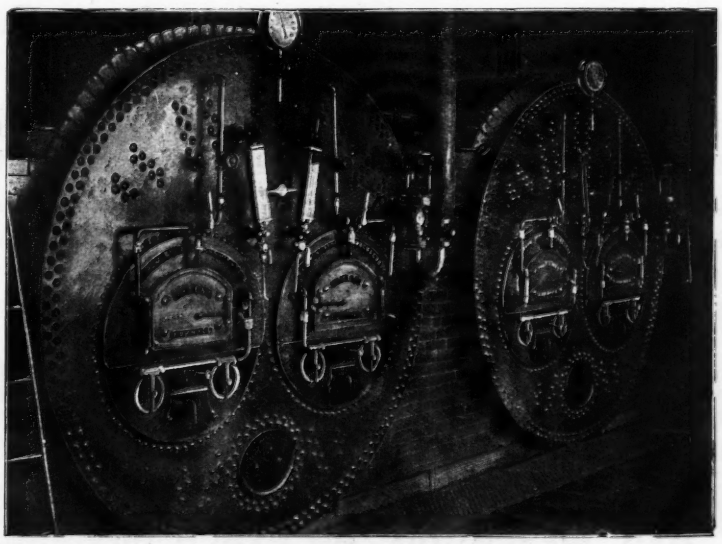

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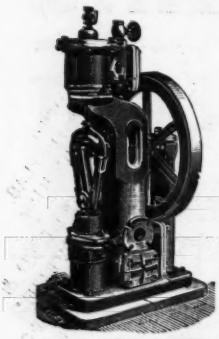

Fig. 705. "SINGLE RAM" STEAM-PUMP.

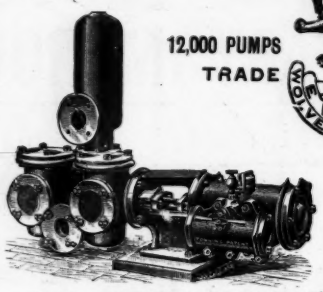

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

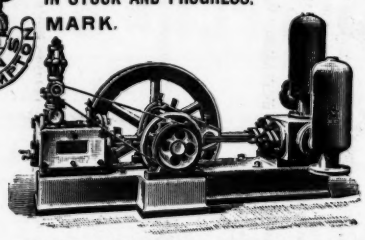

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

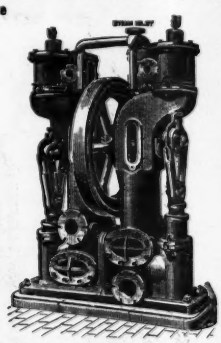

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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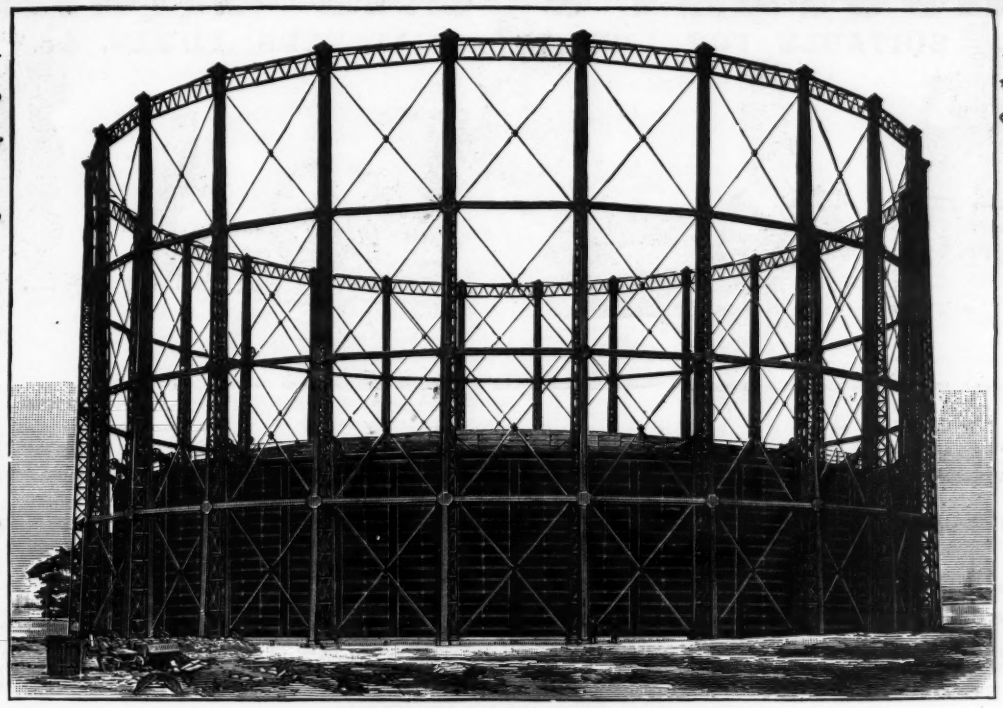

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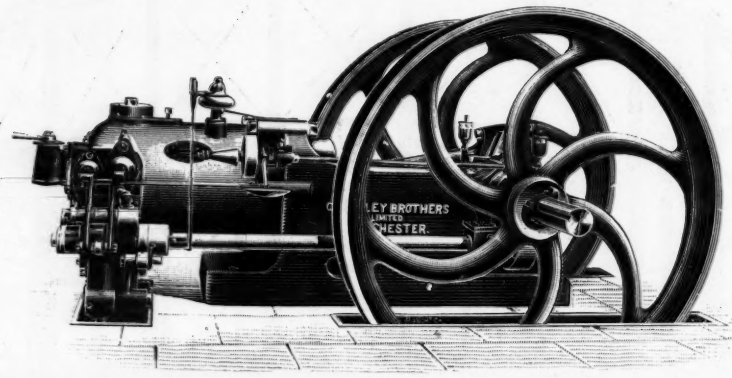

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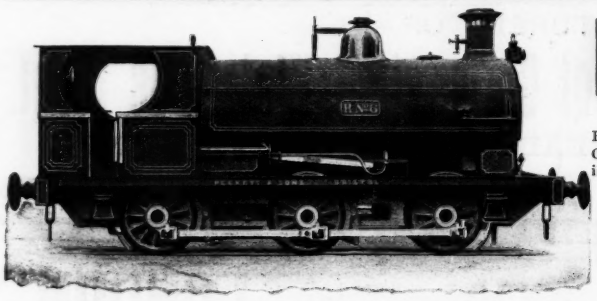

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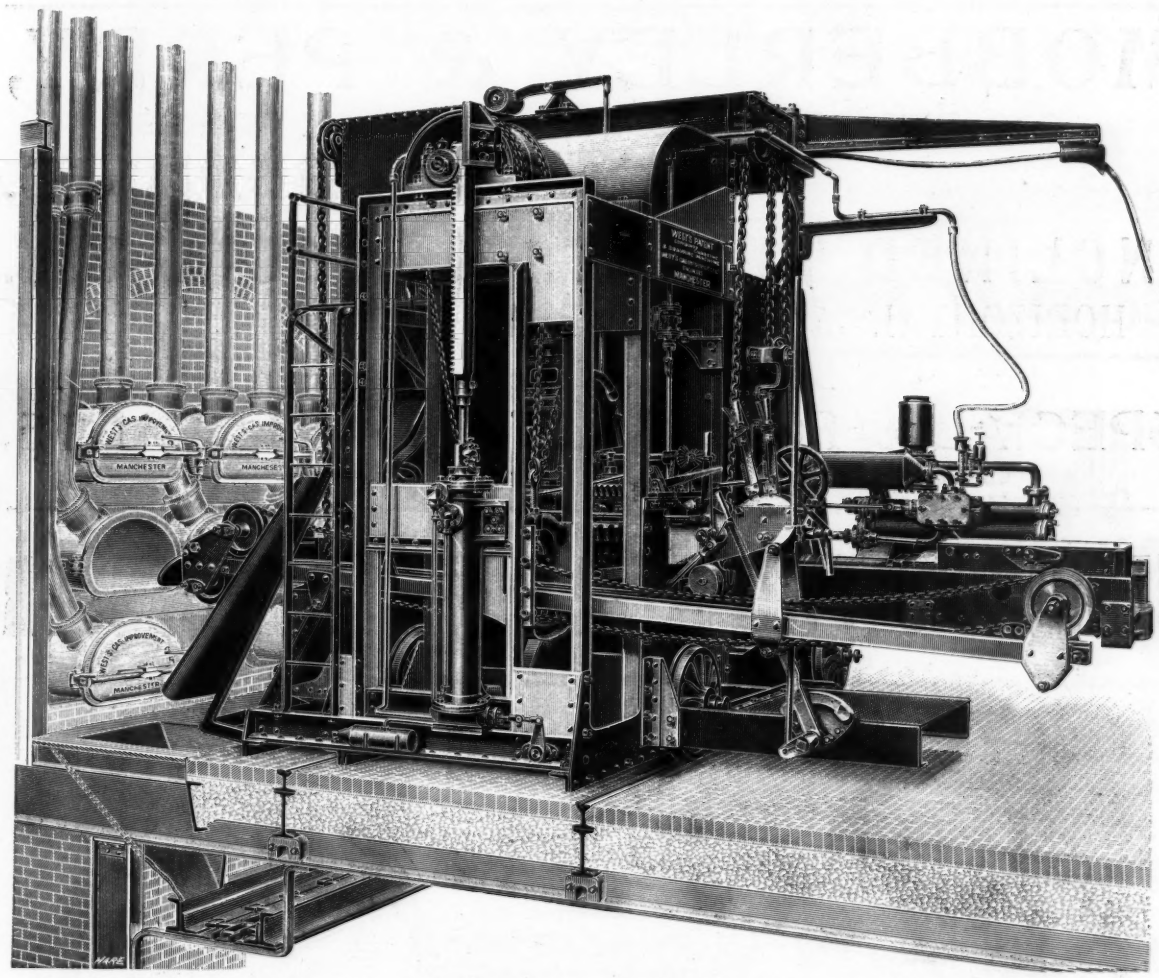

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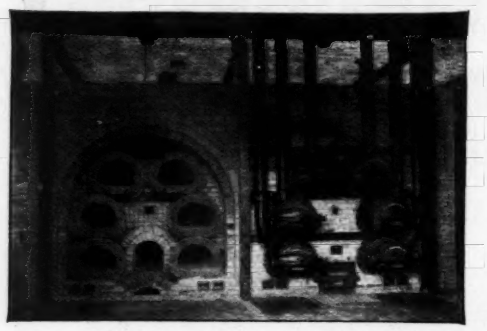

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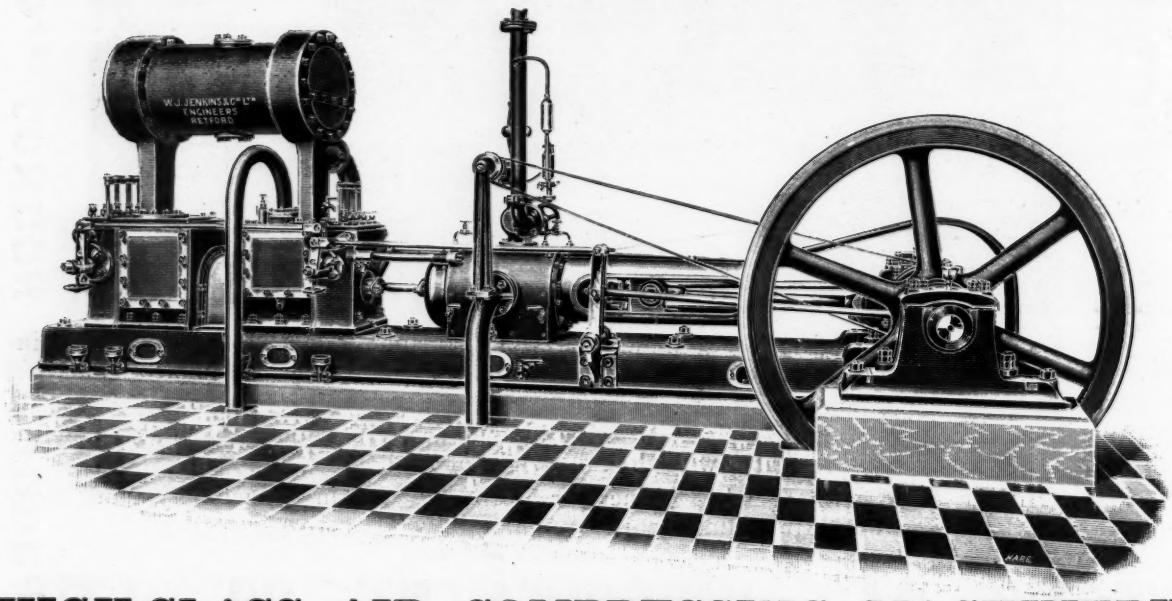

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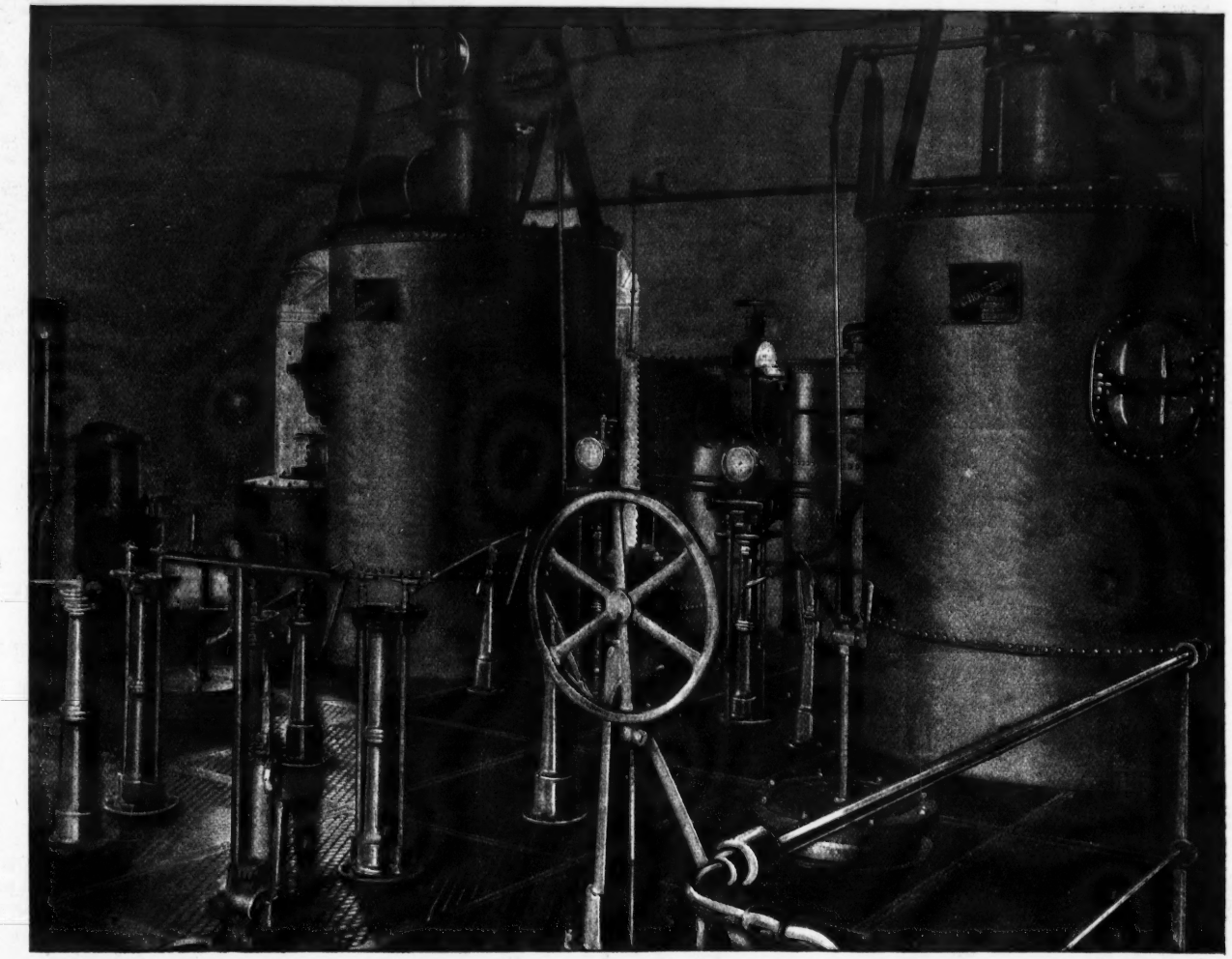

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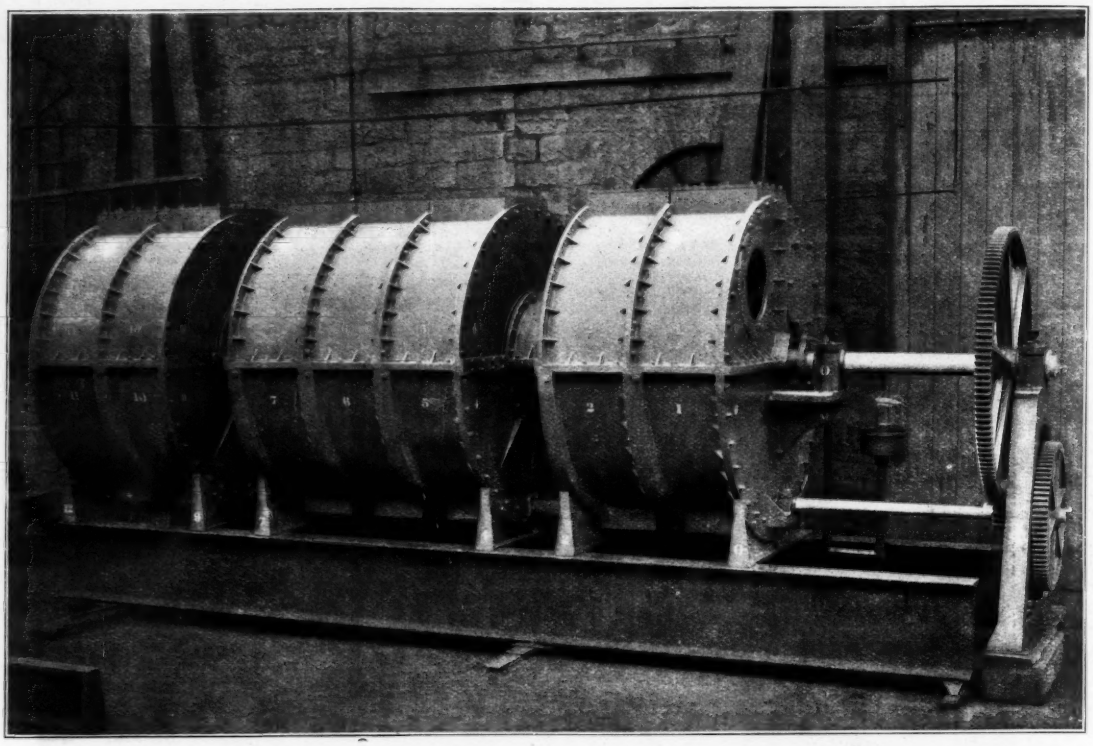

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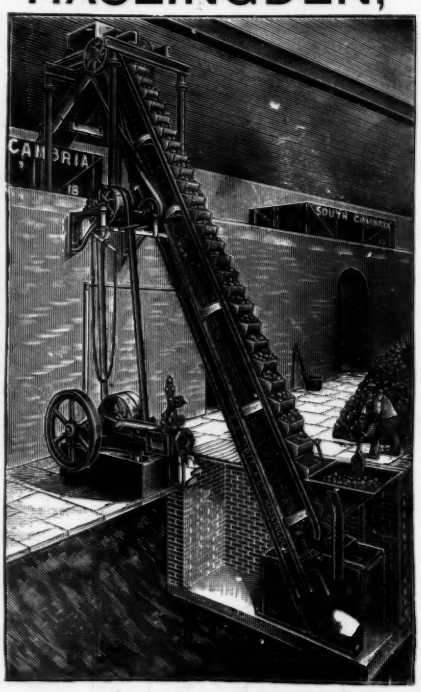

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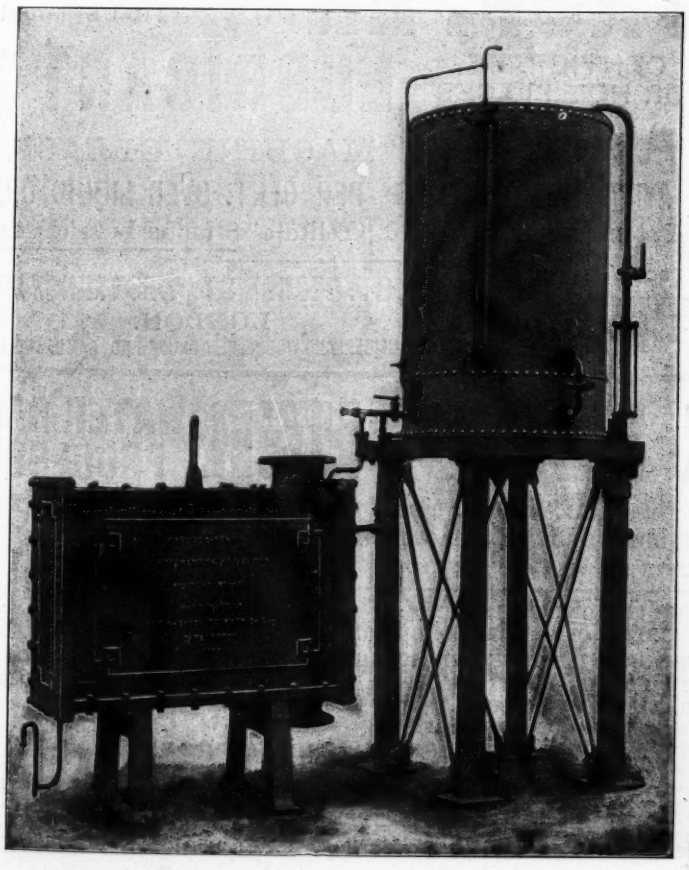

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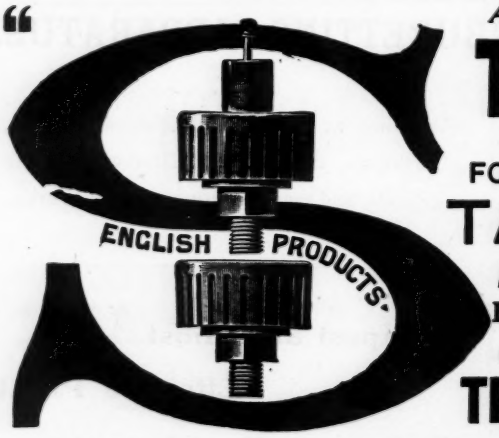

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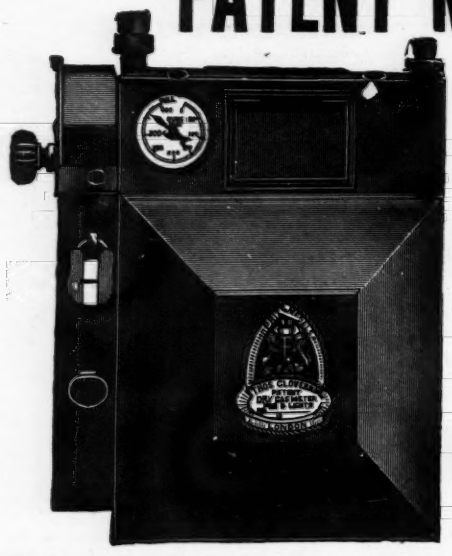

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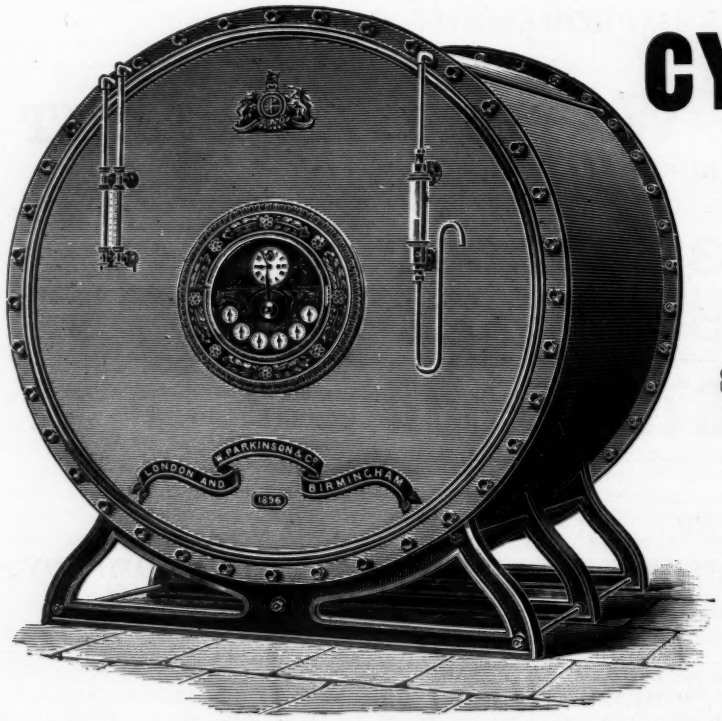

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EDITORIAL NOTES.

The Progress of Bills in Parliament—The Question of Renewal Funds.

IT was announced early last week that no more opposed Gas Bills would be taken in Committee before Easter; but by that time it is more than likely that all the oppositions will have been settled, except in the case of the London and perhaps half-a-dozen or so Provincial Bills. The movement in favour of the composure of differences made great headway during last week; one of the first measures to feel the influence being the Ipswich Bill, settled on a point of the notice required before testing. The petitioners against the North Middlesex Gas Bill persisted to a hearing; but an amicable agreement was concluded during the luncheon interval, on the basis of the Company getting their capital and allowing a testing-station in the district, without notice. This tendency on the part of petitioners to magnify the importance of testing is not a satisfactory sign of the times. After 1900, it might have been hoped that the ancient importance of penalty testing would have declined everywhere. But it has not been so this session. The Hampton Court Gas Bill, after appearing first as an opposed measure, went through eventually unopposed; and it is understood that all parties are satisfied with the turn matters have taken. By way of accounting for the lack of contentiousness in regard to these various Provincial Bills—mostly small—it may be pointed out that in no case do they propose any new departure or raise an important principle. Both sides to Private Bill legislation, so far as it applies to gas, seem at length to have learnt the lesson of moderation and reasonableness.

While upon this topic, we desire again to engage the attention of those regular readers of the "JOURNAL" who are interested in what may be termed the higher polity of gas supply by companies, to the question of renewal funds. Both Plymouth and North Middlesex have already equipped themselves with this aid to sound financing. The question has been asked, how such a provision as this differs from the common practice of providing for repairs and renewals; and the answer is that it does not in principle differ at all. In point of fact, it only provides a statutory receptacle, with an accredited label, for an allowance which, in the temporary form of a suspense account, well-managed gas undertakings are in the habit of setting aside. Why, then, it may be asked, form such a fund in this formal way? The answer is, because human nature is weak; and in the case of a sliding-scale company, the temptation for directors of the ordinary brand to divide profits "up to the hilt" is frequently overpowering. It is for the same reason that sliding-scale companies, unless in strong hands, do not usually possess such reserves as maximum dividend companies. It requires far more virtue than many directors possess to keep their fingers off money to which they, as shareholders, have a perfect legal right, but which would be better bestowed in strengthening the undertaking. The idea is—and it seems a good one—that where there is a regular renewals fund, there will be greater readiness on the part of the Board to keep it up, than there is to forego earnings on the assurance of the management that the money is wanted for upkeep or a suspense account.

At the present juncture—when one of the pinches that periodically close upon the gas industry, and make the treasurer count the sovereigns, appears to be passing away, and an era of greater ease approaching—directors ought to seriously consider whether they are doing as much as they might accomplish in providing for the depreciation and antiquation of their property. Gas-works usually, unless they happen to be in very low water indeed, are kept up in a thoroughly adequate and satisfactory manner, so far as regards ordinary repairs and the small renewals. There is reason to suspect, however, that there is a different tale to tell of many gas undertakings in respect to larger affairs of the same category. Obsolete capital, for example, exists in numerous cases—we had almost written the majority of cases—where an undertaking has outgrown its ancient site and new works have been started. And there is not only capital which is obsolete in this strict sense, but there is capital which has been improperly spent, misapplied, and lost. It is not right that the burden of every piece of folly, extravagance, or even worse errors, of a past administration should be perpetual. The question of whether gas companies should amortise their capital, like local authorities their loans, has always been answered in the negative; and wisely so, because it cannot be just to make proprietors a present of their stake. But there are degrees in this as in all matters. It is the fashion for some Boards to regularly inform shareholders that the works and plant are in good condition and sound repair. Why not extend the assurance to cover the points of proper allocation of charges as between revenue and capital, and adequate provision for depreciation, antiquation, and economic unfruitfulness? How many gas companies would dare to turn an auditor armed with boundless powers of criticism, of fact as well as of law, loose into their affairs every half year, and engage beforehand to publish his remarks without correction?

There is one more point; and we make it in the hope that here and there a prudent gas-works administrator who knows his book may take note of it. We shall not be in the least hurt if a number of gentlemen write to say that they have already attended to the matter. It is this: The capital cost of gas-works buildings and manufacturing plant is not only far greater than it was only a few years ago, but a great deal of the extra cost goes for perishable ware. Think what a difference there is between a modern retort-house and the structures which went by the same name some twenty—aye, even ten—years ago! It is not merely the moving machinery we are now thinking of; for, oddly as it may sound, this is not necessarily the most perishable object upon which capital is spent. A new pin, a wheel, a plate, keeps machinery as good as new for years; although, of course, it must always be depreciating all the time. But what of the iron stanchions, rusting in damp ashes; the plates wearing and corroding away; the roofs vanishing in smoke daily? Build up a retort-house in the style of the St. Pancras or St. Enoch's railway station, and what will it be like fifty years' hence? Not a puff of steam rises but helps to rot a rivet; not a whiff of sulphurous moisture but leaves its traces somewhere. If there is a building more calculated to destroy itself in use than a modern retort-house, we should like to hear it named. Here, then, is the justification for the importance attached to renewal funds—an importance which, in its proper place, it would be difficult to overrate.

Should Personal Property be Rated?

AN exceedingly useful, and, for serious citizens, interesting debate took place in the House of Commons on Friday, upon Dr. Macnamara's motion for the second reading of his Land Values Assessment and Rating Bill. Unfortunately, the matter is not of the kind that appeals to those who prepare the news of the day for sale in the usual form; and therefore few newspaper readers throughout the country will be able to follow the debate intelligently, though it touches very closely their interest as ratepayers. For this reason we propose to explain what Dr. Macnamara wanted, and how he proposed to secure it. The Bill was based on the assumption that in great centres of population, and more especially in London, there is a direct relationship between rate expenditures and land values. According to this view, the landowners are the residuary legatees of the great bulk of rate expenditure. The more money spent in this regard, the more valuable does the land become. It is one form of "unearned increment." As leases fall in, owners of the land are able to enormously increase ground-rents. Every public improvement paid for by the ratepayers enhances the value of the land in the neighbourhood. The Bill was designed to catch this increment, by assessing all town sites apart from the use made of the land, thereupon empowering the local

authorities to levy a land value rate on this description of property of not exceeding 1d. in the pound in any financial year. To the question of who was to pay, the answer was that, in order not to disturb existing contracts, the occupying tenants would have to bear the new rate. This seems a funny way of relieving the ratepayers of their present admittedly high burden; and it is no wonder that the House failed to see the beauty of the proposal. The ideas and motives of the owner of the Bill failed to hang together. Granting all that can be said concerning the great and increasing pressure of the rates, and the urgent necessity for finding some fresh source of revenue to help in supporting the cost of local government, it does not follow that the nostrum which Dr. Macnamara had got hold of was the proper one; and the very fact that the expense was to be thrown upon existing contributories, is sufficient proof that it was a misdirected remedy. Besides, if the supposed new contributories to local financial resources deserved to pay anything at all, it would be most absurd to let them off for the small ransom suggested by Dr. Macnamara. He must have had some uneasiness in his own mind as to the soundness of his proposal, or he would surely have carried it farther. It was hardly worth while to go through so much in order to gain so little.

Of course, it stands to reason that if the assessment of site values were adopted as a principle of raising money for local purposes, property owners such as gas and railway companies—whose undertakings happen to require a considerable area of land—would be very hardly done by in comparison with others who might not require any land at all, or very little. Compare a gas-works with an electric light station, or a railway with a tramline. Compare, also, the ownerships of these different undertakings. It will then be easy to understand why local authorities, especially in London, should be attracted by Dr. Macnamara's proposal. The suggestion of this statesman, that rating makes high land values, is a remarkable example of putting the saddle on the wrong horse. As Mr. Boscawen well pointed out, whatever may be the causes of increased ground values where this condition prevails, rate expenditure is not one of them. On the contrary, the rates diminish values, or, at least, are a drawback to whatever increase may be due to advantages of the site and the presence of the community, which create the demand for it. Anyone can get cheaply enough a corner site on an Irish bog. Besides, this idea of rating site values proceeds from the mistaken notion that they are not already rated. As Sir Robert Giffen and others have demonstrated, the owner actually does pay; and such schemes as the one in question really aim at making him pay twice over. No proposals of the kind will stand criticism of their principle; while when it comes to details, they could never be properly worked. No land agent would undertake to carry out such a scheme without getting involved in endless disputes.

Mr. Cripps, in opposing the Bill, made it out that the proposer's penny really meant an annual rate of something like 2s. 9d. in the pound. Be this as it may, Dr. Macnamara's notable plan was quite sufficiently riddled by its adversaries; and the circumstance of 170 members of the House being found to vote for it is only another illustration of the uncertainties of a private members' day. Nothing could come of the vote; and therefore it seemed to occur to a number of gentlemen that they might as well take the opportunity for declaring their desire that the urban ratepayers should be helped somehow. Consequently the Bill was only rejected by the narrow majority of 13 in a very full House, which may mean something or nothing. As a matter of opinion, we incline to regard it as an indication of the existence of a feeling on the part of a large number of members of the present Parliament, that something ought to be done in the direction of the reform of local taxation. This is a rather dangerous feeling; because it may easily lead to the doing of something very foolish, in the absence of a reasonable programme of reform. It is difficult indeed for a democracy, naturally impatient of grievances which appear to be the artificial product of old laws and ordinances, to sit down quietly under a glib forensic argument to the effect that all is quite right, and as fair as it can be. Such examples as that of the purchase of land for the new Granton Gas-Works, rehearsed to an attentive House by Mr. T. Shaw, are hard to put up with. The land required was rated at £5 10s. an acre; and the City had to pay £124,000, or some 212 years' purchase. Again, the Edinburgh Water Trust wanted a bit of land for filtering purposes; and for this site, which at 30 years' purchase of the existing rent was worth £4387, the price demanded was £20,000. It requires a powerful imagination to see that the proprietors who realize such handsome premiums on their holdings, merely because the land is wanted for the service of the community, really pay their due share of local financial burdens. Mr. Cripps says they do.

The most obvious reply to such observations is that it is impossible to legislate for very exceptional cases, and that, on the whole, the truth is as Mr. Cripps has stated. Mr. Grant Lawson, speaking for the Government, laid stress on the danger of giving extravagant local authorities the impression that there is yet a gold mine in which they may dig. Our whole system of local taxation requires adjustment to the needs of the age; but this is not for the sole benefit of Progressive politicians, or the endowment of municipal workmen. Already there is practical disfranchisement of the largest ratepayers; and this injustice must be removed by any rating reform worthy of the name. In bringing the debate to a conclusion, Mr. Grant Lawson hinted that there is a solution of the problem with which Dr. Macnamara attempted to deal in so questionable a fashion, which is "to obtain contributions from other forms of property than "the form which is now rated." This can only mean personalty; and if it is the idea of the Government to bring personal property under contribution for the relief of local rates, we can only remark that this will prove the toughest job tackled by any Administration of recent times.

The Supremacy of Incandescent Gas Lighting in London Streets.

THE happenings of late in connection with public lighting in the Metropolis are such that they deserve the utmost publicity that we can give them. For years the lighting of London streets was a reproach to the responsible authorities. Then came the spasmodic endeavours at improvement by the aid of electricity in certain of the more important areas, with what meed in the way of success those who use the streets of London, and those who have to discharge the lighting bills, are best able to judge. Following this, the South Metropolitan Gas Company did a good stroke of work for the denizens in South London when, three or four years since, through the instrumentality of their Chairman, they submitted favourable terms to the local authorities for the amelioration of the night conditions of their large district. It will be remembered that the Company were successful; and now it is Sir George Livesey's boast that if anyone wants to see a good piece of public lighting on the incandescent gas system, he need not trouble to visit the Continent. But looking North of the Thames, the conservatism that has preserved so long, in many important areas, an antiquated mode of lighting is one of the mysteries that surrounded the old and—thank goodness—now defunct parochial bodies. The mordacious censure passed on the lighting of North London by Mr. Corbet Woodall in 1901, in his presidential address to the Southern Association of Gas Engineers, did not by one whit exceed defensible limits. But the flagrant neglect of the general lighting of London streets will soon happily be a thing of the past; and this is one of the first-fruits of the new order of local government. Only recently we have seen that the City Council of Westminster, through their Engineer, have been making a detailed inquiry into the whole subject; and now Kensington, Holborn, Chelsea, and Fulham are all displacing the street flat-flame gas-lights by incandescent burners. Their action cannot be by any means agreeable to our electrical friends; it is, indeed, an impressive commentary on the experience of London in electrical illumination to find this sudden and large break from the old-established form of lighting being made in favour of incandescent gas lighting.

That is not the only notable feature about this notable change. A business-like interest has supplanted the famous apathy of the Gaslight and Coke Company over public lighting matters; and what is more they are actually, in a way, rendering one Borough Council financial aid in the conversion of their lighting from the old to the new! Even the most active critics of the Horseferry Road Administration must pause in the face of this piece of managerial sapiency. The terms of this particular offer—made to, and closed with by—the Borough of Islington are worthy of

special mention. The Company are to supply and fix 17-inch "Westminster" pattern lanterns with Welsbach-Kern (No. 4) burners, mantles, &c., to 4270 lamps in the borough, at £1 19s. 11d. per lamp. The cost of installation—amounting to about £8522—is to be provided in the first place by the Gas Company; and the Council are to reimburse them, without interest, by equal quarterly payments spread over five years, commencing from Midsummer Day next. The gas is to be supplied at the current rate for street lighting; and the Company are to maintain, light and extinguish, and clean the lamps at £1 8s. 6d. per lamp per annum. These details are particularly interesting, in view of the fact that not long since the Company appeared to evince very little concern over the public lighting of their district.

Reformation in street-lighting has also been occupying the attention of the Holborn Borough Council; and they have resolved upon the conversion of the whole of the 1487 flat-flame lamps in their district to the incandescent system. In this instance, the Gas Company were unsuccessful with a tender of £2 2s. for the conversion of the lamps; and the work is going to be carried out by Messrs. Pontifex and Co. at £1 17s. 6d. per lamp, or a total of £2788. Maintenance in this case (exclusive of the mantles) is to be 6s. 6d. per lamp per annum. Using No. 3 Kern burners, it is estimated that there will be a saving in the consumption of gas, compared with the present system, of 0·75 cubic foot per lamp per hour, or a total in the year of no less than 4,394,085 cubic feet. Looked at in another way, the Council calculate that there will be an increase in the volume of light equal to 300 per cent., and at the same time a reduction in the cost of gas to the extent of £530 per annum, which will go towards the cost of the mantles. Then, again, there is the Borough of Chelsea, the Council of which, after considerable experiment, have pronounced a preference for the Scott-Snell air-compressing gas-lamp; and it is understood that they are going to instal the system throughout the streets. It may be of interest to add that of the 28 Metropolitan Boroughs, no less than 18 are at present using incandescent gas lighting in their streets—some entirely and others partially; and the large schemes which have already been noticed will constitute substantial additions. This awakening in the matter of public lighting in London is a matter of importance to its people; and that so many of the local governing bodies of the Capital of the country should have had their affection for electricity so effectually alienated by the incandescent gas system, is a matter for supreme satisfaction on the part of the gas industry. London has tried many lights during the past few years; and the "fittest" has won where commonsense has been the adjudicator.

Municipal Topics—A Potent Plea for Economy.

The Association of Municipal Corporations has held its annual meeting, in the City of London. It was presided over by Sir Albert Rollit, and attended by a "potent, grave, "and reverend" company of Mayors, Aldermen, and Town Clerks, from the 293 boroughs that are now represented by the Association. Very businesslike are the meetings of this organization, and the tradition of hard common sense in the treatment of the great variety of topics discussed on these occasions is always well maintained. The President, in the course of his address, was careful to declare himself as one who is by no means prejudiced in favour of municipalities undertaking work which can be done as well by private enterprise. He declared in unmistakeable terms that both the State and Municipalities should do those things which individuals cannot do for themselves, or cannot do so well. This is a principle that must command general approval; but the bearings of it must be sought for in its applications, actual and prospective. It is satisfactory to learn that Sir Albert Rollit and those for whom he speaks do not subscribe to the contention that classifying any municipal undertaking as remunerative is equivalent to an excuse for its existence. The Association appears to fight shy, for the time being, of some of the most serious problems of current municipal policy, such as that of the local franchise as exercised by municipal servants and the occupiers of municipal tenements which are mostly of an eleemosynary character. The views of the Town Clerk of Birmingham on this head are known; but the extent to which they are shared by his colleagues is somewhat doubtful.

There is yet another grave matter in regard to which the judgment of leaders of municipal opinion would be valuable if it were known. This is the extent to which the rating of a community affects its eligibility in the estimation of founders of factories and possible residents. The continued prosperity of any centre of population, industrial or residential, depends upon its power of growth, which is partly internal and partly due to immigration. Those who are tied to their home for any reason must put up with the treatment accorded to the district by its local authority; but those who feel themselves imposed upon, and have it within their power to go elsewhere, will sooner or later do so. The same influences will act as a deterrent upon immigration. There is reason to fear that this consideration is not always sufficiently regarded by the parties to municipal extravagance; but outsiders notice it. When a stranger is pondering upon the attractions of several otherwise equally eligible places of abode, a little will determine his choice. If it can be pointed out that the local rates in one particular district are lower than they are elsewhere, and especially if it appears that they differ from the general rule in inclining downwards, though it be ever so little, the attraction will be positive. It is not everybody who is enamoured of free libraries, free baths and washhouses, or even electric lighting sold at less than cost to somebody else, and all out of the rates. People who are free agents, to come or go as and where they please, take notice of these things, and are disposed to keep out of their way.

Enlightening the Gas Consumers at Grantham.

If the gas consumers of Grantham have not henceforward a keener appreciation of the capabilities of the commodity supplied to them by the Grantham Gas Company, it will certainly not be due to incapacity on the part of the Company's Engineer and Secretary, Mr. R. G. Shadbolt, to enlighten them thereon. The holding of a gas exhibition in the Exchange Hall a few days ago afforded him an opportunity of supplementing the information he conveyed in a lecture delivered some time ago, by some additional particulars in regard to the value of gas as a useful and an economical agent in the production of light, heat, and power. Mr. Shadbolt, like many other gas managers, has to meet the competition of the electricians, who naturally desire to push business and make out the best possible case for their light. But they find in him an opponent quite capable of defending the cause in which he is engaged, as will be seen from the extracts from his later lecture given in another part of the "Journal." Some of his audience were probably astonished as he discoursed upon the possibilities of incandescent gas, more especially when working under pressure. From the three candles per cubic foot of the old flat-flame burner to the thirty or forty candles of the new system, must have seemed incredible. But Mr. Shadbolt showed them that this quantity of light could be produced, and that there was no reason for doubt on the matter. Turning to the calorific property of gas, he pointed out how much more advantageous it would be for a consumer to avail himself of it than to resort to an agent which is not only less economical than the older one, but, unfortunately for the user, has the habit of withholding its services just when they are most needed. The worthy burgesses of Grantham did not know what a treasure they possessed in the gas supply; but Mr. Shadbolt brought the fact home to them in a very striking manner in the little group of figures tabulated towards the close of his lecture. It is a useful compilation which may be commended to the attention not only of those for whom it was prepared, but of those who require information—as so many do in these days—as to the comparative cost of gas and electricity.

Gas Supply in Germany.

The annual report of the German Continental Gas Company once more bears evidence of the severe industrial depression through which the country in which their operations are mainly carried on has recently been passing. It could not be expected that the business of gas supply would be absolutely unaffected while all other branches of trade were suffering so much; and taking everything into consideration, the accounts are perhaps more satisfactory than might have been anticipated—though on this occasion the dividend is at the rate of only 10 per cent., as

compared with 12 per cent. for 1901 and 14 per cent. for the year before that. The net profit was £12,341 less than for the preceding twelve months (which again was £7670 less than in 1900); but this was owing chiefly to the low price obtained for coke, and not to an actual falling off in the quantity of gas sold. There was, indeed, an increase of 4·85 per cent. in the production of gas to set against the reduced receipts from coke. In this regard, it is interesting to note that the proportions of the make used for lighting and heating and power purposes—74·09 and 21·98 per cent. respectively—are almost the same as in the previous year. There is, however, a slight increase under the first-named heading, and a decrease to practically the same extent in the unaccounted-for gas, which has now reached the commendably low figure of 3·93 per cent. As we remarked last year, it is the consumption of gas for power purposes which is most liable to be affected by the condition of trade for the time being; and this being so, it is extremely gratifying to find that, in spite of the unfavourable conditions existing, the Company during 1902 increased by eleven the number of engines to which their gas is supplied. The report states that the industrial depression appeared to have reached its lowest point in the first half of the year under review, and that matters have since considerably improved. The shareholders in the Company therefore have some grounds for looking forward to an early return of the palmy days of 6 per cent. annual increases in the production of gas and 14 per cent. dividends.

English Manufacturers and Foreign Competition.

Every little while a cry goes up from our manufacturers as to slackness of trade and severity of foreign competition. For the latter perhaps in some measure they are themselves responsible. Two little instances of how work is sent adrift have come under notice during the past week. In the first one it was stated that the Somzée-Greyson Intensified Gas-Light Syndicate, being desirous of having their burners made by an English firm, invited quotations from a number of brass goods manufacturers, and the replies from some of these were highly interesting. The excuse for not giving a quotation in more than one instance was that the writers could not "effectually compete with foreign makers." Could advice be more direct than this that the Company should send their burners for production out of the country? Then there were others who excused themselves from quoting on the ground that they would have to make special tools for the production of the burners. Of course they would; but surely those makers would not contend that all patent burners should be sent out of the country for that reason? The refusal of manufacturers to even look at the work almost compelled the Company to send it at once to Germany, from whence unsolicited offers to make the burners had been received. However, they were determined not to be thwarted in their desire to have the burners produced in this country; and after much effort they succeeded in placing orders for the various sizes of the burner with a good Birmingham firm. Why there should have been so much trouble in getting English manufacturers to take up this work while German makers were so ready to do it, it is difficult to understand. But there is the fact. Then at the Society of Arts last Wednesday, Mr. Arthur Kitson (in a paper dealing with petroleum incandescent lighting) stated that so far no English firm had been found who could manufacture the large oil-tanks required in his system of lighting "at any price approaching that for which they are sold in the United States." Yet the making of these cylinders on this side would have meant a considerable business for someone! What is the secret of these things—supineness, incapacity, or what? If manufacturers themselves open the door to foreign competition, they must not complain if it takes advantage and steps in.

The Payment of Back-Dividends.

The Directors of the Kent Water Company incurred a very justifiable expenditure of their funds in obtaining a definitive pronouncement upon a question which had been raised by a stockholder as to their right to apply surplus profits in making up a dividend of 10 per cent. for a period of upwards of fifty years antecedent to June 30, 1864, or whether they should be applied in constituting a reserve fund to secure future dividend, and, subject thereto, in reduction of the water-rates. Prior to the above-named date, the Company were under no obligation as to supply, nor was there any limit to the rate they might charge for water or pay in dividend. In 1864, however, this condition of things was changed by the incorporation of the Water-Works Clauses Act, 1847, in an Act which it was necessary to obtain. Thenceforward 10 per cent. was the limit of dividend permissible, subject to the statutory power contained in section 75 of the General Act to make up deficiencies. In virtue of this power, all the arrears since 1864 had been paid, and it was in contemplation to do likewise with those which had arisen in the preceding years, involving a sum of about £700,000. Here, however, the holder of £2500 of 7 per cent. stock of the Company stepped in, and disputed the right of the Company to do this, and accordingly, in a friendly way, moved for an injunction to restrain them from applying the funds in the manner proposed. The question was duly brought before Mr. Justice Joyce on the 18th ult., and the proceedings were reported in the "JOURNAL" on the following Tuesday (p. 486). In the result, the injunction was granted; and the Company appealed. The matter was argued before the Master of the Rolls and Lords Justices Romer and Cozens-Hardy; and by a unanimous judgment, the decision of the learned Judge in the lower Court was confirmed, and the injunction was made perpetual. These proceedings were reported in our "Legal Intelligence" last week. The Master of the Rolls pointed out that, in adopting the Water-Works Clauses Act, 1847, the Company were placed in the same position as a new company incorporated for the first time. In return for the advantages conferred by the Act, certain obligations had to be borne. The Company had the benefit of being able to make up past deficiencies, subject to the obligation of not paying more than 10 per cent. dividend. By "past deficiencies" must be understood those arising subsequently, and not prior, to the date of the incorporation of the Act specifically referring to them; and the word "dividend" in section 75 must be taken in its ordinary popular sense, and not, as had been contended on behalf of the Company, in its strictly technical sense, as meaning "the sum available for distribution." This *dictum* was justified, his Lordship said, by the sense in which the word was used in other sections of the Act; and it was only by an artificial and strained construction that any other than the ordinary meaning could be given to it in the particular section named.

The Maidstone Explosion Again.

The Corporation of Maidstone are adding neither to their reputation as a businesslike body nor to their dignity by persisting in their refusal to meet the Gas Company with reference to the cost of repairing the damage caused to the bridge by the fatal explosion of gas which occurred there some months ago, and other expenditure incurred in connection with the disaster. The amount involved is not a large one; for the Company have already compensated the sufferers, and offered to pay the actual sum required to put the bridge in repair. This the Council, in committee, agreed to accept, after a consultation had taken place between the Mayor, the Town Clerk, and the Chairman of the Company. When, however, a meeting of the Council was held to consider the recommendation made by themselves in committee, a proposal was put forward that the Company should be asked to pay the fee of the Engineer who examined the bridge, as well as for the time spent by the Surveyor and his staff in connection with the matter—amounting altogether to about £120. After considerable discussion, this course was agreed to by a majority of one; so that the Council in open meeting assembled are of a different opinion from the Council in committee on the subject—which is strange. The adoption of their latest attitude bids fair to land the Corporation in the Law Courts; for though the Company have so far behaved in a most generous manner, there may be a limit even to their complaisance. If litigation should follow, the case will be a most interesting one, and the Corporation will probably be very far from having things all their own way. One of the main factors in the explosion was the existence beneath the bridge of a large unventilated cavity; and for this the Corporation were responsible. Besides this, it was stated by the Chairman of the Company, at the recent special meeting, that though notice was, on the evening of the explosion, sent to the electricity works that smoke was seen coming from below an electric arc lamp on the bridge, no steps were taken to put out the light. The cavity is still there, in spite of what has happened; but the Corporation

have now agreed to write to the Company asking if they would like it filled in, and if so whether they will pay the cost. Truly, the Council are careful of spending money! There is, however, such a thing as false economy; and this the members may discover, if the fixing of the liability for the accident should be relegated to a Judge and Jury. The £120 for which these zealous guardians of the public purse are holding out will not go far in law costs, even if they win; while if they lose, there will be many people ready to say it serves them right. The desire all along shown by the Company to come to an amicable arrangement has deserved more reciprocity than it has received at the hands of the Corporation. Gas companies, however, do not always—we might almost say, do not often—receive the consideration to which they are fairly entitled.

WATER AFFAIRS.

River Pollution and Water Protection.

In the reply given by the President of the Local Government Board to the representative deputation which waited upon him towards the end of October last to call his attention to the subject of the protection of sources of water supply, and urge upon him the pressing necessity for an inquiry into the existing state of the law on the subject, it may be remembered that he dealt successively with the three phases of the question which had been presented to him—viz., pollution, waste, and water rights. With regard to the first—and this is the one with which we are now specially concerned—he pointed out that a Royal Commission then sitting was inquiring into the matter, and that they had already given some indications of their intention to further investigate it. Their labours so far had led them to the expression of an opinion, in the course of an interim report, that the general protection of rivers is of sufficient importance to demand the creation of a separate Commission or a new department of the Local Government Board, which should be the "supreme rivers authority" dealing with all questions relating to rivers and their purification, and be endowed with power, if called upon, to take action when any local authority failed to do so. In view of this clear indication that the question of pollution was engaging the attention of the Commission, Mr. Long felt that he could not recommend the Government to appoint another whose reference might seem to encroach upon that of the existing body. This reluctance was quite appreciated by the deputation; and it has now been fully justified by the recommendations contained in the third report of the Commissioners, which was published on Friday. It deals first with the relations existing between local authorities and manufacturers in regard to the disposal of trade effluents, and secondly with the need for the constitution of a central authority for the settlement of differences arising, the protection of sources of water supply, and the collection of facts and the scientific investigation of questions of general importance relating to the protection of water.

With regard to the first point, it appears that there has hitherto been differential treatment of manufacturers by local authorities, which has had the effect of hampering trade; and the Commissioners express the opinion that, as far as possible, all manufacturers should be placed on an equal footing. Further, they think the law should be altered so as to make it the duty of the local authority to provide such sewers as are necessary to carry trade effluents as well as domestic sewage; and that the manufacturer should have the right, subject to the observance of certain safeguards, to discharge his effluents into the sewers if he wishes to do so. The Commissioners do not consider it would be possible to provide, by direct enactment, what those safeguards should be. They suggest that it would be desirable for each local authority to frame regulations for the district under their supervision, and that these should be subject to confirmation by a central authority. In most cases, however, they could provide definite standards for the different manufacturers as regards preliminary treatment; but power to vary them, or to dispense with them altogether in special cases, would be necessary. On the subject of riparian rights, the Commissioners point out that in many cases a part, or possibly the whole, of the water which a manufacturer uses in his business is drawn from a stream, and must therefore be returned to it; and they do not propose that he should be relieved of this liability by statute. Nor do they consider that a local authority should be liable for the infringement of riparian rights by the discharge into their sewers of the water so taken.

We now come to the second branch of the subject dealt with by the Commissioners—viz., the constitution of a central authority for the settlement of disputes. Why, it may be asked, should these differences not be disposed of by the Courts? Because, in the opinion of the Commissioners, such tribunals are unsuitable for the determination of the questions at issue. Scientific, technical, and administrative matters are involved; and they think all these could be more satisfactorily considered by a Government Department than by a Court of Law. They therefore unhesitatingly recommend the creation of a central authority, which they believe—given the possession of adequate technical knowledge—would command the confidence of all the parties concerned. They suggest that it should consist of an administrative head; a bacteriologist having special acquaintance with the bacteriology of sewage, trade effluents, and water supply; a chemist possessing like qualifications; and an engineer conversant with geology and water supply. A laboratory should likewise be provided. The work of the proposed authority will be so intimately connected with that of the Local Government Board, that the Commissioners consider it will be for many reasons desirable to make it a new department under the Board, rather than an entirely separate one. With regard to the functions of the proposed authority, they are to exercise "a general superintendence over "the whole country in regard to the prevention of the pol-"lution of water," direct any inquiries and investigations they may consider desirable, and generally "stimulate and "encourage Rivers Boards to an active exercise of their "powers." The Commissioners do not propose that the central authority should take the place of local bodies in regard to the protection of rivers and other sources of water supply; on the contrary, they think the power in existence upon the spot should be utilized to the fullest possible extent. This, in their opinion, can only be done by the formation of Rivers Boards throughout the country; and therefore they recommend that this shall be done. One of the first duties of the central authority would be to ascertain what grouping of counties would be most effective, and then take the necessary steps to constitute Rivers Boards for those areas.

The Commissioners proceed to define the duties of these bodies and of the central authority, and then briefly consider the questions of the waste of water and its abstraction from one district for distribution in another. They conclude their report by giving a short explanation of the position of their investigations and a general indication of what remains to be done.

Loss of Current in Distribution.—An interesting paper on distribution losses in electricity supply was read by Messrs. Constable and Fawssett a few days since, before the Institution of Electrical Engineers. The figures given were obtained from the working of the Croydon central station, which has an output of 1250 kilowatts. Roughly, the total losses amount to 21 per cent. of the units generated, and are divided as follows: Switchboards, and connections, 0·5 per cent.; cable losses, 8·5 per cent.; transformer losses, 9 per cent.; and meter losses, 3 per cent. The cable losses are the most difficult to reduce.

Reeson on the Metropolis Water Act, 1903.—In the "Journal" for the 30th of September last, we noticed the publication by Messrs. Butterworth and Co. of a valuable compilation by Mr. Joseph Reeson, the late Assistant-Secretary and Registrar to the Gaslight and Coke Company, consisting of the Acts relating to the supply of gas and water by companies and local authorities from 1817 to the close of the ordinary session of last year, which ended in August. When the work was issued, the Bill dealing with the water supply of the Metropolis was before Parliament, and therefore could not be included. The author promised, however, in the event of its passing, to publish it as a supplement, uniform in style. This he has now done through the above-named firm. The whole of the provisions of the new Act bearing upon its practical working are printed in full; the heads only being given of those dealing with matters of detail. Important features of Mr. Reeson's little book are the notes showing how far the Acts applicable to the Metropolis contained in the larger work will be affected as from the "appointed day"—June 24, 1904, or such other day as the Local Government Board may appoint. By means of these notes, the original volume is rendered complete to the end of last session. The author has added a useful index.

ESSAYS AND REVIEWS.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 848.)

THINGS on the Stock Exchange last week were just as bad as the week before, and perhaps a little more so; for, whereas then the American Market was an exception to the general flatness, this time it was about the worst, and, having the most in it to lose, lost it. But Consols set the tune all round, and were very flat, owing to the "weak bulls" being unable to hold on any longer. On Wednesday, one mark was as low as 89⅞. It is to be hoped things will mend in the course of next month—say, after the Easter account—or else the situation will be most disagreeable. The Money Market was very stiff, and is likely to keep so until all the requirements of the close of the quarter and of the Stock Exchange settlement have been discharged. Business in the Gas Market was only very moderate, except in one or two of the larger undertakings. It is not to be wondered at that the general tendency was downward, seeing how every other department without any exception was flat; and the fact that the actual reductions in quotations made were very slight may be taken as an indication that there is not much weakness of its own in this department, and that movement is more sympathetic than autonomous. In Gaslight and Coke issues, the ordinary was tolerably active on most days of the week. It opened at 81¾, and managed to mark 82½ on the first three days. That was its final effort, and it gradually eased away until the concluding bargain was at 80½. Of the secured issues, there was some little dealing in the maximum, which achieved the agreeable contrast of an advance; but the preference fell 2, and the debenture was put down a point without actual business being done. Transactions in South Metropolitan were only moderate; but the tendency was a little better, and the last bargains marked were done at the best prices of the week. A single transaction was the sum total of business in Commercials; but the debenture quotation was lowered a point. In the Suburban and Provincial group, there was scarcely anything done. But there were some changes of quotation; and these, too, were not all downward. Brentford preference fell a couple; and locally there was a drop in Liverpool debenture. But all the Sheffield issues gained a point. The converted stocks of the Bromley Company came into quotation. The Continental Companies were very quiet but firm; both Imperial and European changing hands at good figures. None of the remoter undertakings presented any feature calling for remark. In the Water Companies, there was more movement, irregular albeit. East London advanced; while Kent and Lambeth receded. There was also some unintelligible fiddling about with the Southwark price; the upshot being that it recovered two of the points lost the week before.

The daily operations were: Gas stocks were steady and unchanged on Monday and Tuesday. In Water, on Tuesday East London and Southwark rose 2; but Kent and Lambeth fell 5. On Wednesday, Gaslight debenture fell 1. Southwark water rose 1. Gas was quieter on Thursday. Gaslight maximum rose 1; but Brentford preference fell 2. Southwark water fell 1. Gas was steady on Friday; but on Saturday Gaslight ordinary and Commercial debenture fell 1 each, and Gaslight preference 2.

ELECTRIC LIGHTING MEMORANDA.

Rejection of the Wiring Scheme of the London County Council—The Permissible Extent of Municipal Wiring—A Legal Point—The Hard Case of Kingston-on-Thames.

LAST week the notorious wiring clauses of the London County Council's Bill were struck out by the House of Commons, by the somewhat unusual expedient of adopting an "instruction" to the Select Committee to this effect. There was a short debate on the subject, in the course of which the usual argument for municipal trading was duly trotted out, put through its paces, and urged at the new jump. It was Mr. John Burns who undertook this congenial exercise; and he did all that was possible to persuade a sceptical House that, as municipal electricity supply is 50 per cent. cheaper than supply by companies, municipal house wiring might be expected to be equally advantageous to the public. The coolness of the assumption is no less remarkable than the distortion of the conclusion. The two things have no connection whatever; and the whole scheme was only another piece of impertinence on the part of the clique of Socialists who run the London County Council and sometimes profess to patronize, and at other times attempt to bully the Metropolitan Borough Councils, just as it suits their purpose. Besides, everybody knows that the imputed cheapness of municipal electricity supply is illusory, and that the pretence is only kept up because a handful of interested partisans pass the word round to "make believe" to this effect in and out of season.

The attempt on the part of the Council to municipalize the electric light wiring trade in the name of the boroughs is strongly objected to by those engaged in the business. They protest, with reason, that there is no occasion for this proceeding in London, or anywhere else where there is work enough of the kind to employ a decent number of private firms. The whole thing, of course, is not at all unlike the state of the gas-fitting trade. There are places where this work has fallen to the hands of the gas company, and has been continued by their successors the local authority; but these are exceptions. It is difficult to draw the line in terms that would satisfy a parliamentary draftsman; but the late Sir Courtenay Boyle fairly stated the case when he said that the Board of Trade objected to public authorities going into ornamental fitting, whether for gas, electricity, or water. There is no real practical difficulty in making the distinction. Local authorities having their own water supply are almost invariably empowered to deal in the necessary consumers' fittings; but this is never interpreted to mean that they can stock and sell every known pattern of bath.

Our contemporary, the "Electrician," expresses a doubt as to whether all this special legislation to permit the municipal wiring of houses is not unnecessary, in view of certain passages in the Electric Lighting Act, 1882, which may be read as covering all that is requisite in this respect. The point is not without ambiguity; but we venture to think, on the principle of interpretation followed by the Courts in respect to general expressions occurring in an Act of Parliament, that the language referred to is limited to the essentials of supply, and would not be extended to cover the consumers' utilization of it. When an Act says that "all such things as may be necessary" to effect the general purposes of the statute are permissible, the words have a particular application. Certain local authorities have wiring powers, while others have not. Here, again, it does not necessarily follow that power to wire houses carries sanction to leave public money sunk irrecoverably in this way. This is what things are coming to, as we have already admitted. But they have not yet arrived at the stage; and the Local Government Board are prudently resisting the movement as long as possible.

The history of the Kingston-on-Thames Corporation electric lighting undertaking is a story of disappointment, disillusionment, and almost of despair. It is a record that should be attentively studied by members of British local authorities who may yet be tempted to take the plunge into municipal adventure of the same nature. The electric lighting affairs of the busy and favourite river town—one of the most flourishing in itself in all Surrey—have been mentioned in these columns on several previous occasions, always with commiseration of the ratepayers. The Corporation went into this business at an epoch when their local leaders were without any such guidance from accomplished facts as they are now unwillingly furnishing for the benefit of others; and they undoubtedly thought they were doing the town a good turn. They were over-confident, on insufficient grounds, and were more than a little headstrong and impatient of objection. It has long been evident, however, that the municipal hopes of profit from electric lighting could never be realized in Kingston; and an incident that has just transpired will tend to confirm the popular belief that the Corporation are in for an irremediably hard bargain, with no prospect of deliverance. The state of affairs was so bad some months ago that the general desire for a thorough inquiry could not be resisted. Accordingly, the Corporation called in Mr. H. R. J. Burstall to see what was the matter, and suggest a remedy, if possible. His report has now been published, and makes very painful reading both for those who were responsible for the existence of the undertaking and for those who must pay for it to the bitter end. It is not that there is anything very seriously wrong at the works. True, the cost of generation is high; but there are reasons for this which do not reflect upon any person in particular. The arrangement of the plant is not of the best; and improvements in regard to certain details might be made. But of what factory might not the same be said? The gist of the report is that the undertaking is not growing fast enough to enable anything to be done under cover of the new business. In face of the fact that the concern is not wanted for Kingston, and can therefore never get out of leading-strings, neither Mr. Burstall nor anybody else can advise what should be done.

THE TRUTH ABOUT ILLUMINATING POWER.*

"WHAT is truth?" asked jesting Pilate; and the writer of the fourth Gospel does not record that One who was pre-eminently capable of answering the question vouchsafed any reply. Without following the Roman governor, and asking for a definition of truth in the abstract, we are impelled, by a study of Mr. Dibdin's table and the accompanying pamphlet, both of which are now before us, to inquire: What is the "true" illuminating power of a gas? We gather that the purpose of the table is to help in ascertaining this attribute of an illuminating gas; but we have sought in vain for Mr. Dibdin's definition of the "true" illuminating power of a gas. We may infer, from his descriptive matter, what would

* "A Table for Ascertaining the True Illuminating Power of a Gas," Deduced from Pole's Law by W. J. Dibdin, F.I.C., F.C.S., &c. Formerly Chemist and Superintending Gas Examiner to the Metropolitan Board of Works and the London County Council (from 1882 to 1897). London: Sanitary Publishing Company, Limited; 1903.

constitute this definition from his point of view; but, after having divined his conception of "true" in this connection, we may be pardoned for asking what claim it has to be so designated.

The fact is that the terms "true," "inherent," "intrinsic," "real," &c., as applied to the illuminating power of a gas are completely illusory. All definitions of the illuminating power of a gas are purely arbitrary and conventional. Some, however, have acquired a preferential position owing to long usage or the special recognition of our legislators. For instance, Parliament has during the past thirty years or more made a thousand or so enactments with regard to the testing of the illuminating power of gas in which one definition of illuminating power is adopted. This definition is that the gas when burnt in Sugg's "London" argand burner, No. 1, at the rate of 5 cubic feet per hour, as prescribed under the Gas-Works Clauses Act, 1871, shall give a light equal to that of 14, 15, or 16 (as the case may be) standard sperm candles. Yet even Parliament refused in nearly all these cases to make its definition absolute. It inserted a saving clause to the effect that the Board of Trade (or some other independent body) might substitute another burner for the "London" argand, No. 1. Moreover, in regard to the dimensions of the chimney to be used with the burner, it was deemed necessary in most enactments to allow some latitude, with a view to adapting the conditions to meet fluctuations in the quality or nature of the gas tested. The one thing absolutely fixed in a thousand or more enactments—for the most part perpetuating the provisions of the Gas-Works Clauses Act, 1871—is that the gas is to be burnt during testing at the rate of 5 cubic feet per hour, whatever might be the burner, the chimney, or the prescribed illuminating power. In the majority of these cases, however, it may be conceded forthwith that the burner allowed (and actually used) is Sugg's "London" argand, No. 1, with a chimney measuring 6 inches long and $1\frac{3}{4}$ inches in external diameter.

Those persons whose high sense of the reverence due to authority is their guiding light, are naturally inclined to insist that the definition of illuminating power which Parliament has thus more or less stereotyped is correct, and that all others are incorrect. If asked what is the "true" illuminating power of a gas, they would say that it is the light produced when the gas is consumed at the rate of 5 cubic feet per hour in the aforesaid burner, &c. This, however, is clearly not Mr. Dibden's definition of the "true" illuminating power of a gas; and it may be observed parenthetically that it has no claim whatever to be designated "true" or "correct." It might perhaps be termed the "statutory illuminating power" of a gas, if it were not that Parliament has made other definitions in certain enactments, which, though comparatively few in number, are not unimportant. Some of these are likely to be either expunged from, or perpetuated in, the statute-book during the present session of Parliament, and it, therefore, would be impolitic to discuss their merits too closely at this juncture. But the definition of illuminating power which they present appears to have but a limited scope—*i.e.*, to be confined to gas of less than 16-candle power. The essential feature is that the rate of consumption is no longer fixed at 5 cubic feet per hour (the one point on which nearly all earlier enactments were in agreement), but is varied with the quality of the gas, so that the light afforded by the flame is always equal to that of 16 standard candles. From the rate of consumption required (in Sugg's "London" argand burner, No. 1) to give this fixed light, the proportional light is inferred for a nominal rate of consumption of 5 cubic feet per hour, and is termed the illuminating power of the gas. It more and more differs from the value found for the illuminating power by the common method of burning the gas at the fixed rate of 5 cubic feet per hour, the farther removed the illuminating power is from 16 candles. The value found is higher than by the more common method if the illuminating power is less than 16 candles, but lower if it is above 16 candles; and hitherto the method of burning the gas under test so that it affords a light of 16 candles appears to have been confined to gas which is required to have an illuminating power of 16 candles or less.

The pervading idea of those who favour this mode of testing the illuminating power of gas which is required to have an illuminating power of (say) 14 candles, appears to be that the "London" argand burner, No. 1, gives its best return when its flame yields a light of 16 candles. This idea is doubtless well founded when the gas burnt is simple coal gas; but it becomes irrational when the gas consists, to an appreciable extent, of carburetted water gas. Then the "London" argand burner gives its best return when its flame yields a light of 18, 19, or 20 candles, or upwards (according to the proportion of carburetted water gas present in the gas). Once the departure from the fixed rate of consumption of 5 cubic feet per hour is sanctioned, there appears no reason why a mixture of coal gas and carburetted water gas, containing (say) 35 per cent. of the latter, should not be burnt, while under test, so that it gives a flame of 20-candle power, even though the gas is required to have an illuminating power of only 12 or 14 candles. To state the matter broadly, the rate of consumption, if not fixed, may reasonably be varied to whatever extent is necessary to secure the best return from the burner with the gas in question. Unless the gas is simple coal gas, the maintenance of a flame of 16-candle power seldom results in this "best return" being even approximately secured with the "London" argand burner. For instance, nearly all the gas supplied in the Metropolis, except the simple coal gas of the South Metropolitan Company, would be returned as of considerably higher illuminating power if it were consumed in the "London" argand burner at such a rate as to give a light of 18 or 20 candles, instead of a light of 14 or 16 candles as at present. It seems surprising that the warm adherents of carburetted water gas as a diluent or enricher of coal gas have not already asked this concession of Parliament.

But neither burning the gas under test at the fixed rate of 5 cubic feet per hour, nor burning it at such a rate that it affords a light of 16 (or x) candles, admits of a result being obtained which can properly be termed the "true" illuminating power. Illuminating power is no clearly defined attribute of the gas *per se*, and the value found by one mode of determination has as much claim as that found by another mode to be called "true," though by compact one value may be accepted for special objects and all the others rejected. It is at best only the "accepted" or "conventional" illuminating power of the gas.

Mr. Dibdin therefore appears to us to have given a delusive title to his tables, which in reality only assign a different value to the gas under test than it would have if either of the two definitions of illuminating power already referred to as sanctioned by enactments were followed. Whether this value—which, apart from the calculations that are avoided by the use of his table, is arrived at by a somewhat cumbrous process—has any better claims to general acceptance than either of the other values referred to, is a question the discussion of which we must defer until next week.

THE LAW OF ELECTRIC LIGHT AND POWER SUPPLIES.

It is a glorious circumstance when a law book can be progressive. As a rule, these substantial, sober works do not change much; but Mr. Shiress Will had a different experience, when it devolved upon him to keep burning that lamp of legal lore relating to gas and cognate subjects which he and the late Mr. Michael lighted such a long time ago. When electric lighting came to town, it looked so much like a side-show of the gas industry, from the legal standpoint, that Mr. Will naturally attached it to the current edition of his big book. As the new-comer grew, however, this treatment evidently became unsuitable for it; and accordingly the painstaking author gave it a volume to itself. Now he has found it expedient to further enlarge the scope of his work, and make it cover the three branches of electric lighting, traction, and power.* It was high time. So far as questions of law are involved, the gas industry, which is accustomed to regard Mr. Will as its standing Counsel, has more to do with the traction side of electrical industry than any other. Curiously enough, electricity supply for lighting purposes does not, in the ordinary way, trouble the legal advisers of gas companies. The two trades may be at loggerheads, but they do not go to law. It is quite contrariwise with regard to electric traction, as represented by "tube" railways and tramways. For, though railways and tramways to be worked electrically do not compete with gas companies in the way of business, they sometimes try to ride roughshod over their rights, and their performances need watching.

For this reason we are very glad that Mr. Will has included electric tramways and railways in his book, thereby largely enhancing its usefulness. Of course, full particulars are given of the Bermondsey clause; and its application to Stoke Newington and Woolwich is duly noticed. The law on the "free-wiring" arrangement appears to be doubtful. In his general introduction to the subject Mr. Will says that statutory sanction for this expedient has become very common, and is to be met with in local authorities' supplies as well as in the case of companies. He admits, however, that sometimes the services of an independent wiring company are required. The truth of the matter appears to be that local authorities cannot expend capital in wiring consumers' premises unless their Special Act empowers them to do so. Yet clause 25 of the Electric Lighting Act, 1882, seems to contemplate this application of the undertakers' resources. There must be a distinction somewhere; but Mr. Will does not point it out.

An important chapter on "Leakage and Electrolysis" introduces Part III. of the book. The circumstances leading to the appearance of this question of electricity leakage and electrolysis in connection with Tramway Bills are fully explained; a definite stage being the adoption by Lord Camperdown's Committee on the London County Tramways Bill, 1900, of the principle that the promoters should be as liable for any damage they might do by electricity as if the Act had not existed. Unfortunately, this provision did not become a model clause; and consequently the point had to be taken afresh in every subsequent case. Still, it was the precedent on which the later Sheffield clause was based. In the Bexley tramways case, a strong combined effort to obtain special protection for gas and water pipes failed; and so the record runs on. The question is still an open one—the Board of Trade being in the attitude of waiting for positive evidence as to the insufficiency of the model clause. The last chapter of the book treats of the Electric Power Acts, which date from 1900.

* "The Law relating to Electric Lighting, Traction, and Power." Third Edition. By John Shiress Will, K.C. London: Butterworth and Co.; 1903.

THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

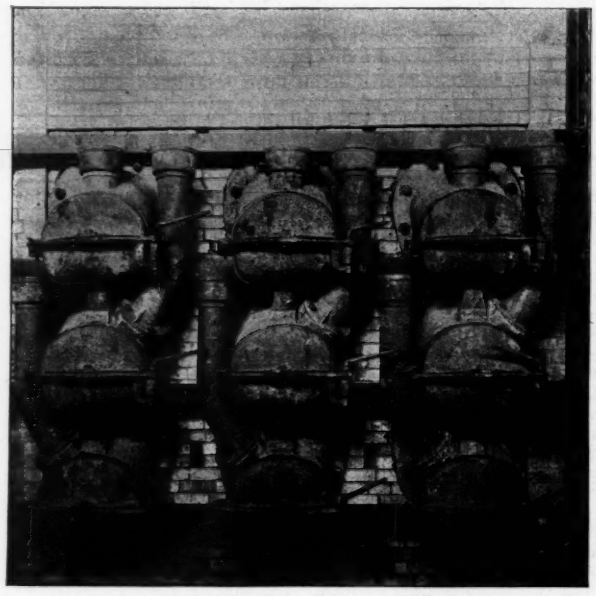
BY

WALTER RALPH HERRING, M.INST.C.E., *Engineer.* *

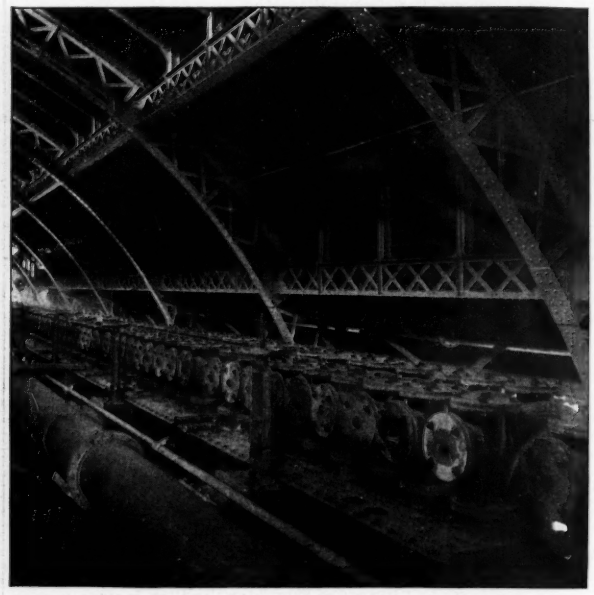
ARTICLE XII. accompanied by Plate No. 13, illustrating Details of Drawing Stage of the 1000 Tons per Day Inclined-Retort Carbonizing Plant—showing Retorts and Mouthpieces, Ascension Bridge, and Dip Pipes, Hydraulic and Foul Mains, also Coke Discharging Shoots, Conveyor and Trough, and Structural Ironwork in connection therewith.

ASCENSION PIPES, BENDS, AND DIP-PIPES.

In order to make a presentable arrangement of ascension pipes for a setting of nine retorts (see Plate No. 13, fig. 1, also photographs Nos. 57 and 59), it was found to be more convenient to arrange the two lower tiers of mouthpieces with flange seatings instead of sockets; the slope of the mouthpiece being made up with metal (see Plate No. 12, fig. 12), so as to form a seating at the proper angle. In all cases, however, one socket joint is provided in the length of the pipes between the mouthpieces and the bridge-pipes, so as to allow for a little give-and-take both during working and also when subsequently re-erecting the settings. Throughout, the ascension pipes and bends are 7 inches internal diameter by ½ inch thick. The ascension pipes are fairly long; but, in my opinion, the condensation resulting from these long pipes has a tendency to keep them free from stoppages—the lower mouthpieces being always moist, as a result of the condensation descending these pipes. The bridge pipe is semi-circular, with caps arranged for cleaning. In each cap, a 1½-inch diameter plug is also inserted. The weight of the ascension pipes and bridge pipes is supported independently of the retort-mouthpieces, and rests upon the structural steel-work of the bench, by means of a bracket projecting from the inner side of the bridge pipe (see Plate No. 13, fig. 2), and resting upon a channel steel running longitudinally the full length of the bench. The channel steel is supported by means of cast-iron standards resting upon the 8 inch by 6 inch H steels, which are supported on the upper ends of the front buckstays secured at one end to the 10 inch by 6 inch cross-bracing tying the front to the back buckstays. The outer ends project over the drawing stage and carry the roller-path for the return chain of the coke-conveyor; a sufficient clearance being left between the height of the standard and the known level of the



PHOTOGRAPH No. 59.—Details of the retort mouthpiece bends and settings.



PHOTOGRAPH No. 60.—Hydraulic and foul mains, seal valve, dip and bridge pipes, and water supply.

brackets on the bridge pipes to permit of packing being inserted for the adjustment of the levels of the retorts from time to time. This device was, I believe, first introduced by myself many years ago. It is of considerable advantage, as it not only relieves the retorts of the weight of the pipes, but also enables the re-setting of the retorts to be performed without disturbing the bridge pipes. The dip pipes have a flange connection with the bridge pipes, as well as a flange attachment to the hydraulic main. The underside of the flange resting upon the cover of the hydraulic main is faced, and the length of the dip gauged to an exact standard and cut in a lathe; the lower edges dipping into the fluid in the main—being bevelled on the inner side (see Plate No. 13, fig. 3).

The hydraulic main (see Plate No. 13, figs. 1, 2, 3, and 4, also photograph No. 60) is of almost a square section, with a slightly curved outer side and a vertical flat back. This shape was designed for the first installation at Huddersfield; the object being to provide an easy means of securing the pipe connections to the main without any unnecessary introduction of curved saddle pieces. The hydraulic valve is bolted direct through to the back plate of the hydraulic main; and provision is made in the main for a maximum depth of 3 inches of fluid below the dip. A separate main is provided for each setting, composed of a ¼-inch bent body plate, a ¼-inch back plate, a ⅜-inch top plate built upon, and riveted to, an angle-steel frame consisting of 3 inch by 3 inch by ½ inch angles. The end plates are also of ⅜-inch steel, bolted to the body by means of ⅝-inch bolts, 3 inches pitch. The back plate is fitted with two cleaning doors (having an aperture of 12 inches by 8 inches) secured by means of set-screws through the plate into a stiffening ring, which, in turn, is riveted to the back plate by means of ⅝-inch rivets. In the back of the main, and at the centre of each back plate, an opening, 16 inches deep by 12 inches wide, is formed, upon which the hydraulic valve is bolted direct. The valve is of special form so as to ensure a regular seal in the main and the free flowing of the tar.

Perhaps I may here say that in all cases when dealing with liquids which are to be retained in vessels at a uniform level, the weir or bar over which the surplus is made to flow is horizontal with the level at which the liquor is to be maintained. In no case is a circular aperture used for an outflow from a tank where a level seal is to be maintained. Theoretically, the circular form only has one point at which the level is perfect. Consequently, a very little thick stuff can easily increase the seal, whereas with a flat weir a considerable area has to be affected before any difference of level can take place.

The valve opening attached to the hydraulic main is 16 inches deep; the bottom being level with the bottom of the hydraulic main. At a point 2 inches up, a weir 4 inches deep is cast, running the breadth of the aperture; and above this the gas opening is 10 inches deep by 12 inches wide. The valve blade is actuated by a hand-wheel and screw, and recedes into a pocket downwards. The top of the sliding-valve is also carefully machined true and level. Assuming that a 1-inch seal is to be maintained in the main, the dip pipes descending to within 3 inches of the bottom,

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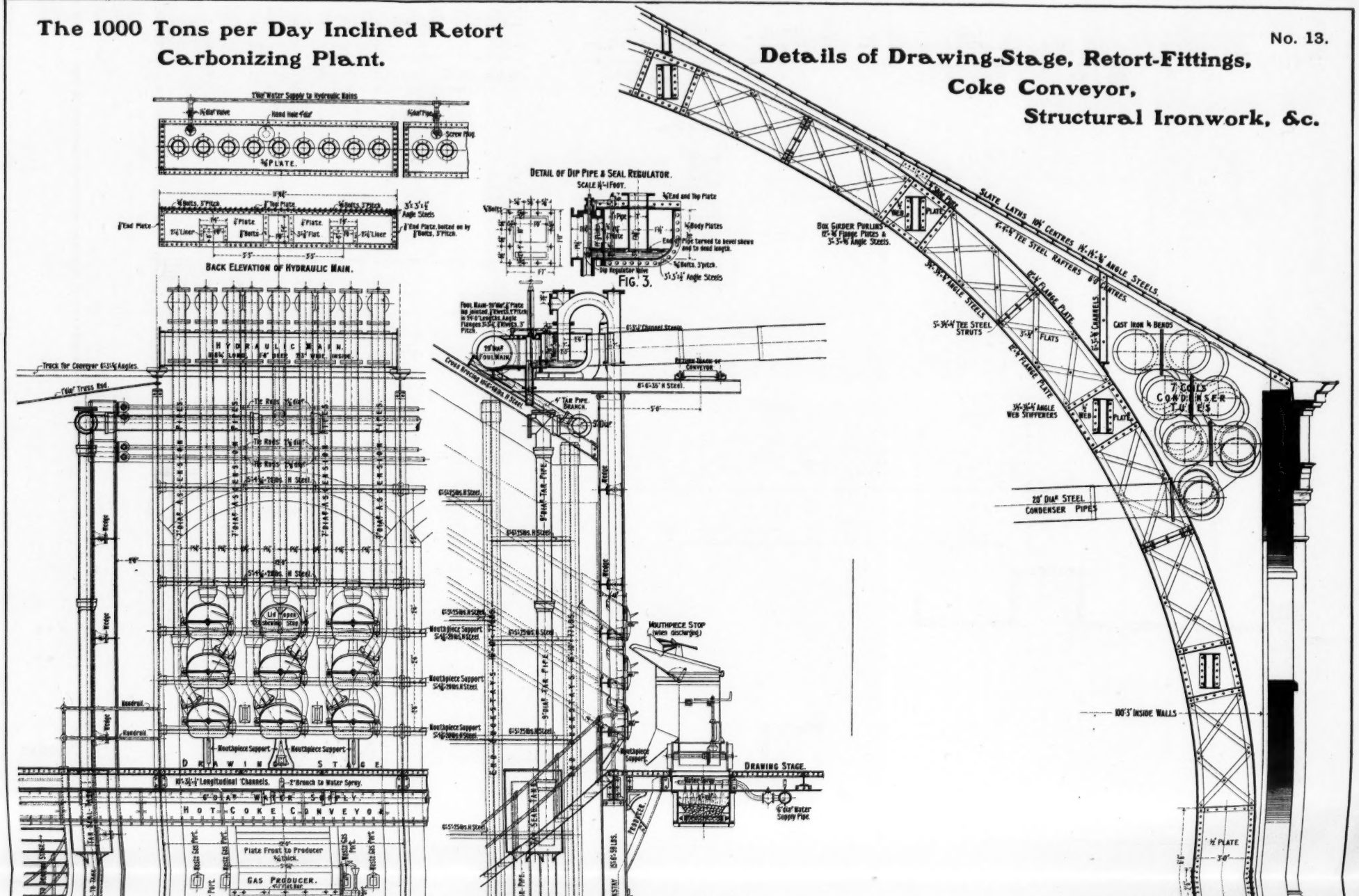
The Granton Works of the Edinburgh and Leith Gas Commissioners.

The 1000 Tons per Day Inclined Retort Carbonizing Plant.

No. 13.

Details of Drawing-Stage, Retort-Fittings, Coke Conveyor, Structural Ironwork, &c.



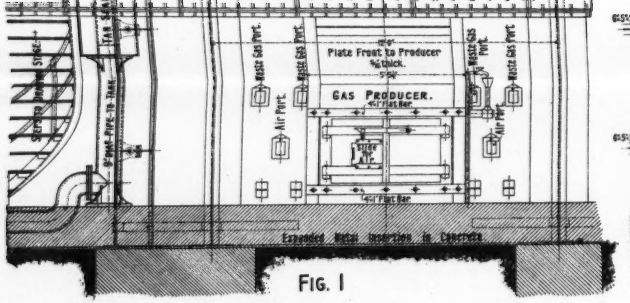


FIG. 1

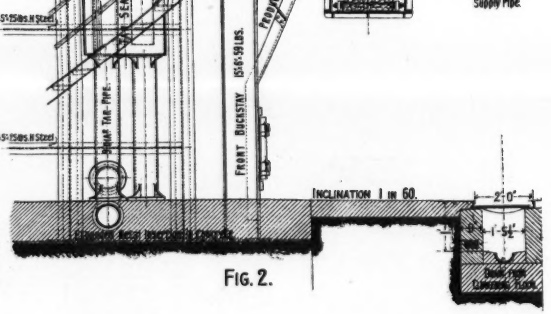
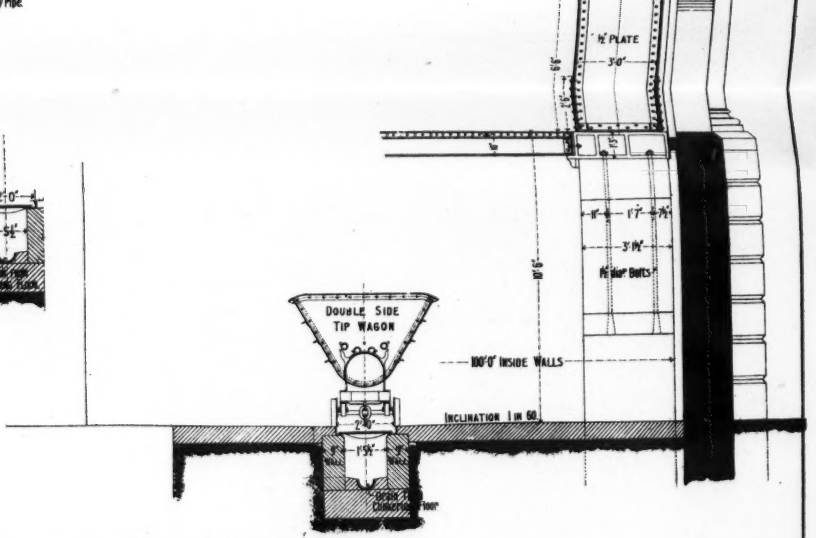
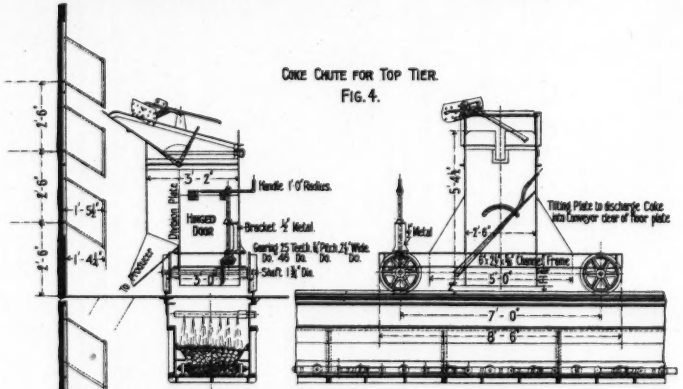


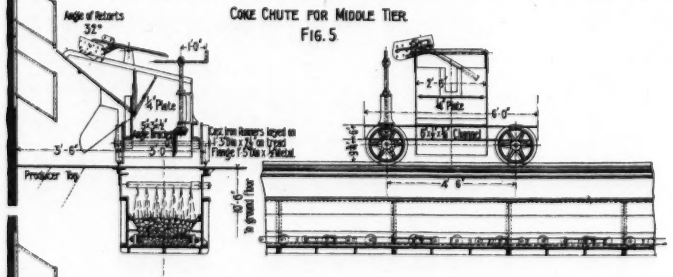
FIG. 2.



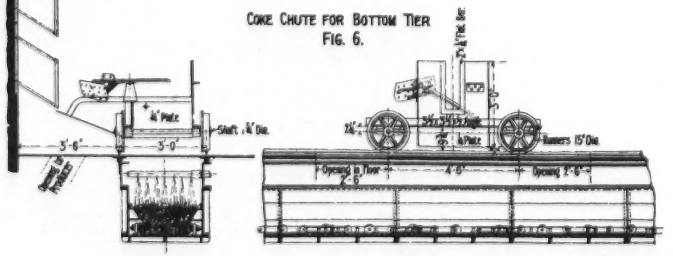
COKE CHUTE FOR TOP TIER.
FIG. 4.

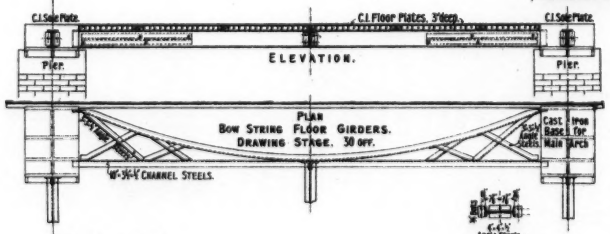


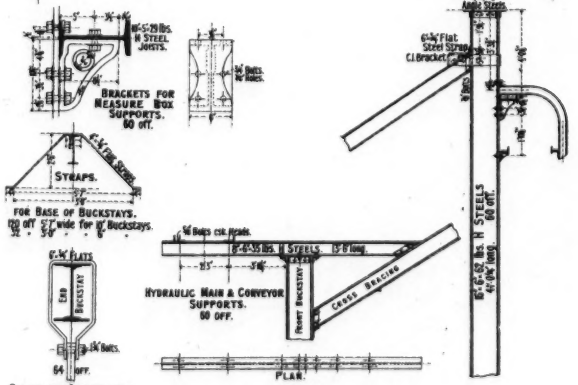
COKE CHUTE FOR MIDDLE TIER.
FIG. 5.

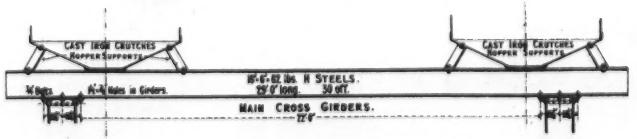


COKE CHUTE FOR BOTTOM TIER
FIG. 6.









WALTER RALPH HERRING,
M.INST.C.E., ENGINEER.

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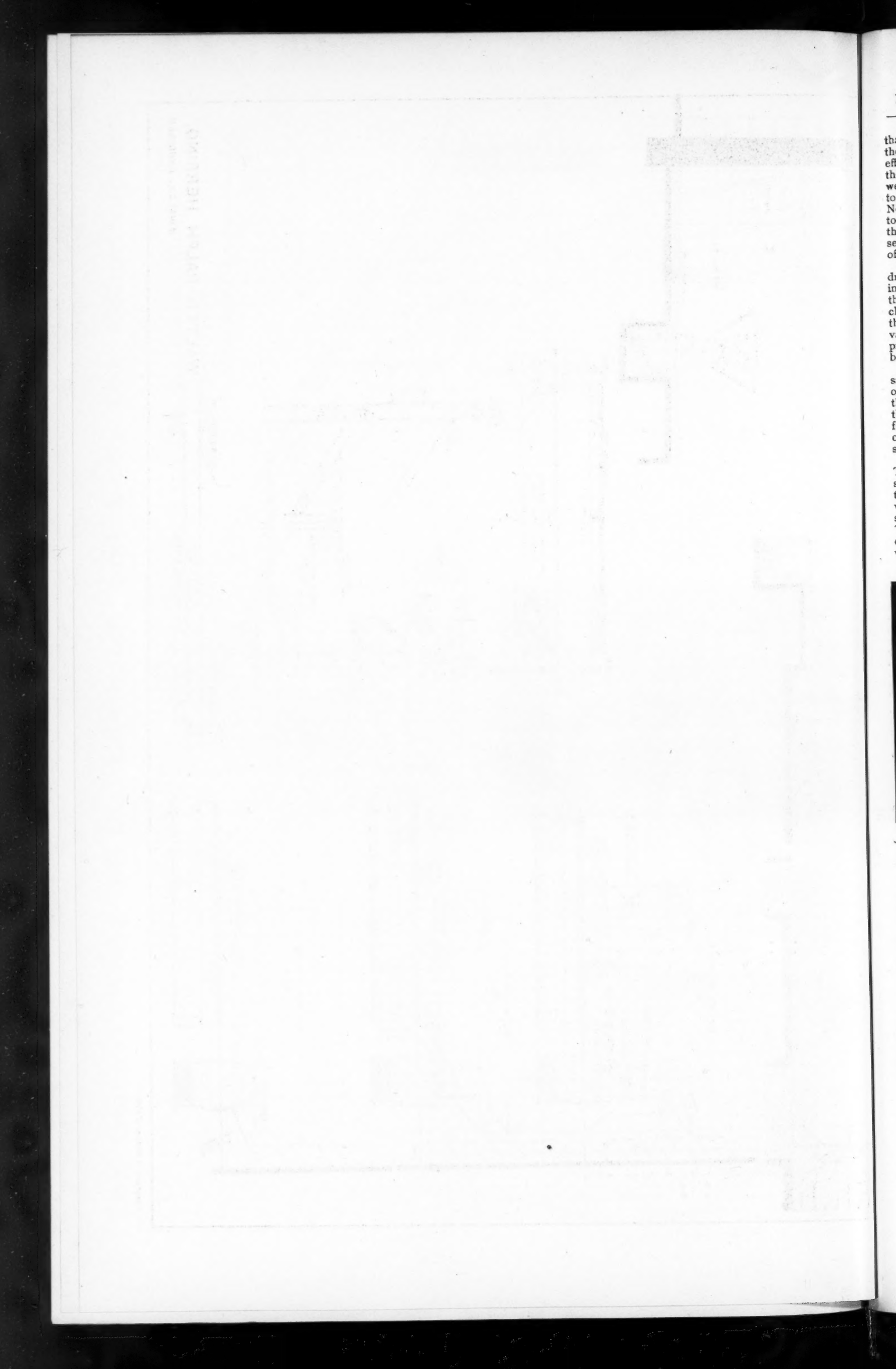


that will require 4 inches of liquor to be present. The valve is therefore drawn up or closed to the extent of 4 inches. The effect of this is to immerse the weir 2 inches in the contents of the main. The heavier fluid must, therefore, flow under the weir, and over the blade of the valve, and out into the foul main to which the valve is attached on the opposite side—see Plate No. 13, figs. 2 and 3. To reduce the seal the valve is opened, or to increase the seal the blade is drawn up or closed. The worst that can happen with this type of valve is that 2 inches of extra seal may be thrown on the main in the event of the underside of the weir becoming choked with tar.

When it is necessary to entirely shut off a section, the valve is drawn to the top and thus closed. The face of the valve is turned in the direction of the pull from the exhausters, with its back to the hydraulic main, so as to keep it tight on its seating. When closed, it is possible to remove the bottom cap and clean out any thick tar that may have accumulated in the lower portion of the valve; the valve during this time being tight into its seating, and preventing the ingress of any air from the settings that happen to be shut off at the time.

In order to allow of the periodical flushing of the main, the same valve permits of the entire emptying of the hydraulic main of its contents by merely opening the valve to the fullest extent—the whole contents flowing out in a few minutes. The valve is then again raised to the position in which it was in before; carefully adjusted pointers on a brass engraved scale enabling the operator to record the exact position so as to give absolutely the same seal.

Each hydraulic main is fitted with a separate water supply. This can either be weak liquor or water taken from the common source. Along the back of the hydraulic mains, and resting upon the valves, a water-supply main is laid, from which branches, with a water-cock intervening, communicate with the T-piece secured by means of a flange at the top of the hydraulic main. The pipe passes through the cover, and is sealed in the contents of the main below; the upper part of the T-piece being secured with a plug.

PHOTOGRAPH No. 61.—Tar and liquor seal-pot and syphon-ove at the end of the retort-bench.

The gas on passing through the hydraulic valve enters a 20-inch diameter foul main (see Plate No. 13, fig. 2), consisting of $\frac{3}{8}$-inch plate lap-jointed, riveted with $\frac{5}{8}$-inch rivets, 2 inches pitch, in 24-feet lengths with angle flanges of 3 inch by 3 inch by $\frac{1}{2}$ inch angle-steels faced and riveted by means of $\frac{3}{4}$-inch rivets, 3 inches pitch, to the body of the pipes.

Opposite each setting a connection is made for withdrawing the tar and liquor from the foul main (see Plate No. 13, fig. 2); the tar connection being made immediately in front of the branch leading from the hydraulic main, so that the fluid contents from it are immediately separated from the gas, and by means of 4-inch branches conducted into a 9-inch tar-pipe running the full length of the bench at an inclination of 1 in 155. The pipe descends over the ends of the bench into a seal-pot beneath the stage-level (see Photograph No. 61), the overflow from which is coupled direct to the syphon well common to the retort-house, condensers, and exhausters.

The estate of the late Mr. James Glaisher, F.R.S., whose death on the 7th ult. was noticed in the "JOURNAL" the following Tuesday, has been valued at £35,814 net.

In the course of a paper on "A Premium System Applied to Engineering Workshops," read by Mr. J. Rowan, of Glasgow, at the meeting of the Institution of Mechanical Engineers, on the 20th inst., he stated that his firm started the system (which was fully described in one of the papers read at the International Engineering Congress held in Glasgow in 1901) in February, 1898, and that since its introduction the time staken by the machine-men had, on an average, been reduced by 20, 23, 31, and 37 per cent. in the four succeeding years—the earnings of the men consequently increasing by these percentages.

THE VISIT TO BRUGES.

Notes on Works and Management Practice.

SECOND ARTICLE.

THERE is always interest to be found in making a comparison of professional practices in a foreign country with one's own methods; and, while it is not expected that this second article on our recent visit to Bruges will have the same attractiveness that the article of last week had for gas engineers—offering as it did to them an entirely new method of charging their retorts—we are fain to believe that the compilation of notes that is about to be presented, showing as it does several variations in practice, will captivate some attention. There may not be a great deal in it from which much instruction and improvement in working and management may be extracted; but by personal contact, in the very midst of his daily work, with a gas manager and engineer of another country, it will be seen that one is able to unearth those points in his methods which, being perhaps indigenous to his country, do not find that publicity which would bring them to the notice of *confrères* beyond its borders. Therefore, in this concluding account of the visit to M. de Brouwer, there may be found a few suggestive points which may be turned to advantage by British gas engineers and managers. The notes refer to matters both within and outside the works; and some of the customs which prevail there will be seen to deviate in certain particulars from methods at home.

IN THE RETORT-HOUSE.

On entering the Bruges Gas-Works, the first part of the plant that claims attention is that dealing with the coke. Naturally in this work M. de Brouwer has his own mechanical progeny engaged; but, before describing some of its points, there are one or two remarks to be made concerning the retort-house. The building itself is the one that was erected at the commencement of these works; and the only reconstruction has been internal. New settings on the generator principle were put in in 1885; but this did not mark the ultimate capability of the house in gas production. When M. de Brouwer took over the directorship in 1866, the retort plant consisted of twelve small settings, worked by as many stokers; and the maximum daily make in the winter was then not more than 200,000 cubic feet. Now the house contains ten settings of elevens; and eight are sufficient to meet the maximum demand. With the eight beds, in a single shift, 650,000 cubic feet of gas can be produced. This is an illustration to add to those which most gas-works of this country can provide, of how improvement in the first process of manufacture has raised doubly and trebly the gas productive ability and value of a given area of ground. A little information about the present settings found a place in the article published last week. Among the prospective plans, is one for dealing with the coal, from its arrival on the works, completely, instead of partially as now, by mechanical means; and in this work it is intended to exclusively employ electrical power.

COKE CONVEYANCE AND TREATMENT.

But while in the retort-house at Bruges with M. de Brouwer, the question of coke-conveyance is uppermost in mind next to the subject of the new coal-projector. Here in this very house was put down the first conveyor of the De Brouwer type, and that was in 1896. The one before us is 2 feet wide; and it is lightly constructed, and works with pleasing smoothness. The information is given that this year the trough has for the first time been renewed, and that only twice in the seven years have the chains required renovation. Our courteous cicerone tells us that his experience is that one of the secrets of efficiency in coke conveying is to make the conveyor work as nearly as possible at its full capacity for the briefest space of time necessary for the accomplishment of the work. In other words, it is all a question of arrangement and expedition in drawing. Says M. de Brouwer, "If you can make 'rush-work' of your drawing, so as to get the coke away quickly, you will have your conveyor working as little as possible, and the wear and tear must be less than when you keep a long length of conveyor running a considerable time to carry away small and thin draws of coke at large intervals apart." In his own case, he has four men drawing by hand rakes simultaneously; so that, in this way, he gets a large quantity of coke into the conveyor directly it commences working, and continuously during its operation.

The method of dealing with the surplus coke arrested attention. Outside the retort-house, it is carried up by the conveyor, and (if not immediately wanted) is sent down shoots into a coke-breaker fitted with double rollers. The top set of rolls acts as a regulator of the supply of coke to the next pair and to the elevator, and breaks the large pieces; while the bottom ones reduce the whole to still a smaller size. From the breaker-pit, the coke is raised by a bucket elevator, the chains of which simply run on a thick plain board; so that renewal in this part of the elevator is quite an inexpensive matter. However, the elevator carries the coke to a rotary screen, which is merely composed of a body of round bar iron, with a screen of $\frac{1}{4}$ inch square mesh outside. Here we come upon another ingenious idea that strikes one as somewhat strange. As the coke comes from the conveyor, the

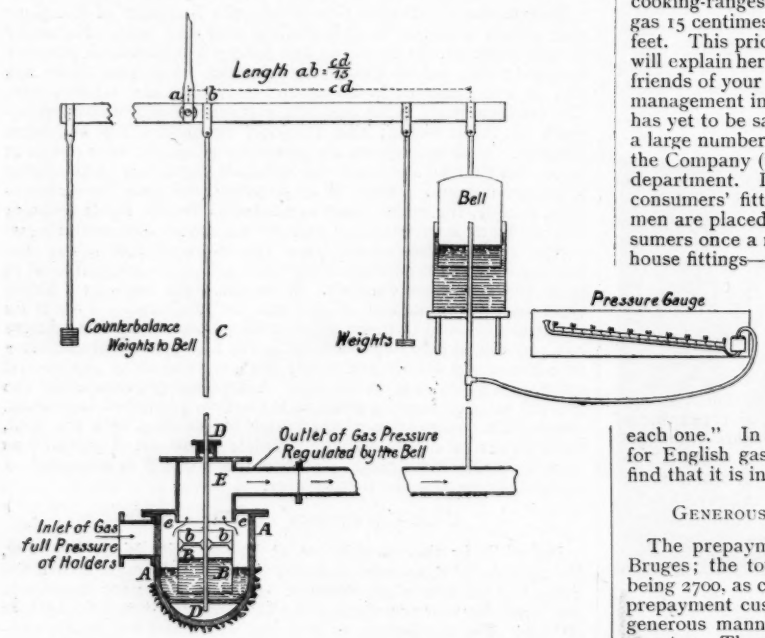
breeze is, of course, damp; and, under ordinary conditions, it would soon choke up the screen, necessitating the frequent attention of a man to keep it clear. To overcome this, M. de Brouwer has run a gas-pipe underneath the screen, in which pipe he has drilled eleven or twelve $\frac{1}{8}$ inch diameter holes. The rough jets of gas thus obtained are kept burning while the screen is at work; and they dry the breeze sufficiently to prevent it choking the screen. The coke is screened into the various sizes to suit the local market.

Automatic Working.

Another interesting feature of the works, is the evident design of the Engineer to make them as automatical as possible, and to concentrate responsibility. It was mentioned in the first article that a 25-horse power gas-engine suffices for the operation of the exhausters, pumps, coke conveying and breaking plant, and the electrical apparatus. To one man is entrusted the work of looking after all the mechanical portions of the plant, the steam-boilers, and the distribution of the gas in the town; and he is able to easily perform the whole of these functions by the automatic aids provided. In fact, all he has to do during the period of operation is to watch and adjust. The machinery under his care is placed in one compact block of buildings, so that no one part of his duties ever takes him far from the others.

Pressure Regulation and Electrical Signalling.

The governing arrangements are a good example of this. There are three governors—one for a 20-inch main and two for the 10-inch mains—and these, together with their valves and connections, only occupy a space 10 feet square. The sensitiveness of the governors is remarkable. Only small weights are used



Arrangements of Pressure Governors at Bruges.

in connection with them; and the necessity for attention in connection with them is communicated to the attendant by means of a simple system of automatic electrical signalling. To make the construction of the governors explicit, M. de Brouwer kindly made a rough sketch, which is reproduced. The arrangement, it will be seen, is so simple as to scarcely require further reference. Below the governor-room a junction is effected between the inlet and outlet mains by means of a chamber having the form of a section of a hydraulic main, A. This contains a liquid seal, into which dip the cylinders B B. These (which are open at both ends) are fixed on a rod C, which is guided at D D, so that, on rising, the edges *b b* are adjusted to the circular edge of the outlet-pipe E at *e e*. The lower the cylinders, of course the greater the outlet for the gas. The bell of the governor in the room above is set (as shown) by means of weights to give a certain pressure. The bell is situated at the end of a long lever, having a short fulcrum on to the valve. When the bell drops, the pressure increases, and the valve is worked with considerable power. All parts are accessible; the valves being altogether independent of the bells. In connection with these governors is the system of electrical bell signals, which are operated automatically by the pressure-register at the central town offices, $1\frac{1}{2}$ miles distant. If the pressure rises above or falls below a certain point, a contact is made which allows the current (generated at the works) to escape to earth. This return current through the earth sets the bell ringing in the engine-room at the works; and it continues ringing until the attendant adjusts the governor. In this way, the pressure in the centre of the town is constantly maintained at any desired point.

A Question of Distribution.

A little reference to the gasholder station (which is located some $2\frac{1}{2}$ miles from the works) will make a convenient link between these interesting points in the management of the works and several particulars concerning the management of the business in the town. The gasholder (which has a capacity of 80,000 cubic feet) is filled during the daytime by a small exhauster, worked by a gas-engine, which draws the gas from the ordinary distribution system. The gas is kept at a minimum pressure sufficient for all wants in the daytime; but it is never allowed to fall under an inch. Then in the evening—the district extending nearly 3 miles farther out—the holder assists in the maintenance of the supply in the outer area. In the morning, the gas-engine and exhauster at the holder station are set in action by one of the meter inspectors; and, when once started, the station is left in charge of a porteress, whose simple duty it is to telephone to the central works if anything occurs that requires attention.

Gas Consumers Studied—The Practice of Maintenance.

Mention has been made of the central gas offices; and a very interesting hour was spent there in M. de Brouwer's company. These offices seem to be an emporium for everything connected with the private and public consumption of gas; and they embrace a fine show-room and fitters' shops. It is, in fact, a centre from which all the business and work connected with the consumption of gas is done. The Company have practically all the gas-fitting work of Bruges in their hands; the policy having been from the beginning—and from the gas suppliers' point of view it is a wise policy too—to furnish the gas consumers with installations at cost price (and sometimes under), including high-class fittings and stoves. Moreover, the gas consumers are supplied with cooking-ranges rent free; but they must use them—paying for the gas 15 centimes per cubic metre, or (say) 3s. 4d. per 1000 cubic feet. This price is higher than it would be, for a reason which we will explain hereafter. The precept of Sir George Livesey "Make friends of your consumers" has long since been a maxim of the management in Bruges, as what has already been said, and what has yet to be said, amply prove. Maintenance is practised; and a large number of the ordinary consumers have contracts with the Company (the payment being a small monthly one) in this department. In fact, it may be said that nearly two-thirds of the consumers' fittings are under the Company's care. Qualified men are placed in charge of this work; and they visit the consumers once a month or fortnight, and examine the whole of the house fittings—cleaning the incandescent burners, changing the mantles when wanted, and giving any necessary attention to the stoves. "All this work," says M. de Brouwer, "is done at a very small expense to the gas consumers; and we find ample reward—first, in knowing that our consumers' premises are satisfactorily lighted, and, secondly, in the larger number of consumers secured, and the increased consumption of gas obtained from each one." In this system of maintenance, there is nothing new for English gas managers; but it will be interesting to them to find that it is in vogue to such a full extent on the Continent.

Generous Treatment of Prepayment Consumers.

The prepayment business has also been largely developed in Bruges; the total number of meters now fixed on this system being 2700, as compared with 2000 on the ordinary system. The prepayment customers, to say the least, are treated in a really generous manner—far exceeding anything that is done in this country. They are supplied with a complete gas-cooking range free of charge, and *any number of incandescent burners they need*. The price paid by them is 20 centimes per cubic metre, or (say) 4s. 6d. per 1000 cubic feet—this price *including all the expense of maintenance of mantles, chimneys, &c.* It is found that the average consumption of mantles is 1·8 per year per burner, or (say) one mantle per 3500 cubic feet of gas sold. In addition to this very considerate treatment, the prepayment consumers are allowed a discount of 20 per cent. (one 10 centime piece out of every five) when they consume an average of 1 metre a day during the six summer months from April to September. This no doubt has something to do with the fact that the gas consumption in the summer months under the prepayment system is equal to four-fifths that of the winter months. The average consumption per prepayment meter for all purposes is nearly 10,000 cubic feet a year; and the discount mentioned reduces the price from 4s. 6d. to 3s. 6d. per 1000 cubic feet for the summer months, and as a mean from 4s. 6d. to 4s. 1d.

More about Maintenance—The Twice-Used Mantle.

If interest has been found in what has gone before, the relation of what was seen and heard in connection with the treatment and use of incandescent mantles in Bruges will, we think, engage the attention of readers even more. On entering the show-room at the central offices, the eye was immediately arrested by shelf after shelf bearing trays of clean incandescent burner tops all furnished with mantles ready for use. Some of the mantles were about $4\frac{1}{2}$ inches in length, and were fitted to tops for burners consuming 4 cubic feet of gas an hour. Others were only $2\frac{3}{4}$ inches long, and these were fitted to tops for burners consuming about 2 feet an hour. We must confess to some astonishment

when M. de Brouwer communicated the intelligence that these shorter mantles were simply some good remnants of the longer mantles after use in private houses—the shortening being effected by the removal of the frayed bottom parts. These are used in certain positions in the streets, and we will make further reference to them presently. The clean burner tops, with the mantles in position ready for lighting, are placed on trays and carried in boxes—holding from nine upwards—by the maintenance men for use on the street lamps or in private houses. The same burners and mantles are used for both services. Bruges (as most readers are aware) is only a comparatively small town; but the large proportion of consumers on the maintenance system shows the extent to which interior incandescent gas lighting has spread. And the town is only an example of what is almost general in the Continental countries nearest to our own shores. We must stay to make a few remarks on this method of replacing dirty burner-tops with clean fitted ones. Our information does not include a single instance of the adoption of a similar method in this country. On the contrary, while the system of carrying clean burner tops and mantles is an everyday part of the gas business in Continental cities, news comes of at least one engineer in this country who has tried to demonstrate that it is impossible to do it without serious injury to the mantles. How comes it then that in Bruges 4⅓-inch mantles are taken out in this manner, used in private houses, taken back to the gas offices, and then many of them divested of their frayed portions, and used afterwards for a long period for cluster-lighting in street lamps?

The Seasoning and Burning-Off of Mantles.

Remarking the interest evinced in his incandescent gas lighting methods, M. de Brouwer inquired whether we should like to see his seasoning and burning-off apparatus. Nothing could give greater pleasure, because here again there is a departure from the general practice at home, and which departure no one seems to care to try here. Why, is a mystery, seeing that on the Continent it is becoming quite a common and everyday part of the work of the gas distribution department, and is carried on without the slightest evidence of trouble. Continental gas engineers appear to be fully persuaded that an improved duty is obtainable from mantles by treating them direct in this way and fitting them to burner tops as required, without putting them through the colodionizing process, which, in their belief, has a deteriorating effect, and causes an unnecessary expenditure of money. M. de Brouwer, for example, obtains his impregnated fabrics ready for seasoning and burning at the rate of about 2½d. each; while the same mantles in a finished and colodionized condition would cost at least 3¾d. to 4d. a piece. Certainly the life of the mantles he showed seems to be a testimony in favour of this direct treatment of the fabrics. One small end of a workshop at the gas offices suffices for all the plant requisite for the burning-off; and M. de Brouwer interested himself in showing its operation. The apparatus was supplied by the Central Werkstatt, of Dessau; and it merely consists of a little hand burning-off machine carrying ten "intensif" bunsen burners (and consequently capable of dealing with ten mantles at a time), a hand pump for raising the gas to the necessary pressure, and a holder for the compressed gas. (The hand pump, by the way, is about to be replaced by a small gas-engine.) Over the burning-off machine is fixed a hood and shaft for carrying off the fumes. The gas is supplied to the burners at 60 inches pressure of water. In our friend's demonstration, he showed how the burning-off of ten mantles does not occupy more than three minutes, when the drying of the fabrics has been previously thoroughly performed. But he impressed this upon us, that his experience proves that mantles from different makers require different treatment. The best conditions for burning-off for the various makes is, however soon ascertained after a little practice.

Public Lighting and Some Peculiarities.

Chatting further over incandescent lighting matters, it was ascertained that a few peculiarities obtain in connection with the public lighting that are worth noting. Incandescent lighting has not been adopted in the streets of Bruges to the extent that we expected to find it; but an inspection convinced us that what there is of it is remarkably good. With such brilliant testimony before them of the high efficiency of the system in comparison with the poor flickering flat-flames, we could not help giving expression to a feeling of wonder that the authorities of Bruges have not taken steps ere now to raise the standard of their public illumination throughout the town by the general use of incandescent burners. A view of the streets at night where the latter type of lighting is not in use brings to mind Longfellow's words—

> Silence, silence everywhere,
> On the earth and in the air,
> Save that footsteps here and there
> Of some burgher home returning,
> By the street lamps faintly burning,
> For a moment woke the echoes
> Of the ancient town of Bruges.

The "faint burning," we regret to see, is still characteristic of the majority of the street lamps; for the incandescent method of lighting is only to be found in the principal places and streets. In the open spaces, it was observed that the lanterns are fitted with clusters of three burners; in the ordinary street lanterns, with two burners; and in a few instances, with one. The height of the columns is 11 feet; and their distance apart, 125 feet. The lanterns are fitted with 4-feet burners, all steatite topped. By way of experiment, in a few places, single flat-flame burners have been replaced by two 2-feet (about) incandescent burners, on which are used the tops of the mantles removed from private houses, to which reference has previousiy been made. M. de Brouwer tells us that these mantle remnants are quite as good as small new mantles; and they last for a long time without any visible diminution of lighting power. In fact, his photometrical tests declare that two of them, with a combined consumption of 4 cubic feet of gas, render a light of 50 candles.

Now we came to another curious arrangement in connection with this public incandescent lighting. In part, it has to be paid for by the residents in the streets which it illuminates; the charge to them being worked out at so much (a few pence a year) per metre length of façade. The price of an ordinary flat-flame burner is about £1 10s.; and the price for a double incandescent burner is about £2. The price is calculated in this wise: The two incandescent burners do not consume more gas than a common flat-flame burner (200 litres); and the general expenses are the same. The surplus price covers the maintenance, and the rent for the more expensive lanterns. Considering this small difference in the cost, and the large benefit realized, it is a matter for surprise that the authorities have not determined before this upon the conversion of the whole of the street lighting to the incandescent system.

However, it will be seen from this that the residents of Bruges who enjoy incandescent lighting in the streets bordered by their premises, have to contribute to the cost; and, in fact, in one way the consumers, although supplied by a private company, have to bear the burden of a part of the general public lighting. Under the terms of the concession, the public lighting is paid for at a considerably less figure than the private consumers are charged and so the latter have to pay much more for gas than they would do if the public lighting was paid for at a fair and remunerative figure. If this happy state of things existed, the general charge for gas in Bruges would not be much, if any, more than the prevailing price in South London. But the gas industry of Belgium, like most other Continental countries, is entangled in this concessionary system; and, under it, the authorities make the utmost of the rights and duties they can impose upon the concessionaires, who have to observe them with scrupulous precision in order to have a good record to present when the time comes for negotiating a continuation of the concession. For the residents as ratepayers, in one respect this is good; for the residents as gas consumers, it is bad. The infliction upon the concessionaires of a life limitation, with an uncertainty of prolongation, and many ordinances, with advantages to the public authority as a recognition for the privilege of being allowed to exercise the rights granted, all have the effect of keeping the charge for gas to the consumers at a higher price than it would otherwise be, retarding too the reductions that could be made by adopting improvements. In this respect gas companies working, and consumers receiving gas, under the statutory regulations of our own country are in a far better position. We are convinced more than ever from this visit to Bruges that the concession system is a wrong one applied to such a supply as gas. Here we have in the town evidence of the best of gas management, but the consumers are not obtaining under this management the best that could be derived were progress not repressed by existing influences. However, the Company have to the best of their power served the people well; and we hope they will be permitted to have the opportunity of showing them that, under more favourable conditions, they can do even better.

This brings us to the end of our notes; and we are satisfied that what has here been written will not have been found uninteresting. There may be points noted which gas managers on this side may find worth emulating, or at any rate trying; and for those that may not be considered, or are manifestly not, worth copying, it may be claimed that they have their interesting side. This peep, too, into the inner working of a Continental concern has shown some deviations between their and our practice; and we conclude by again thanking M. de Brouwer for allowing us to take the peep, and for his courteous willingness to impart so much information.

With reference to the statement in the last paragraph but one of the first article, as to the consumption of electricity at the Bruges Gas-Works per twenty-four hours, for all the machinery and the lighting, M. de Brouwer informs us that the 8 kilowatts mentioned is too low. It should be 8 kilowatts, exclusive of the lighting. He adds: "The charging-machine running idle takes from 12 to 15 ampères × 120 volts; and on charging, from 20 to 24 ampères—say, an average of 20 ampères × 120 volts = 2400 an hour. The machine is used twelve times in the twenty-four hours, and for less than 5 minutes each time. Thus we may put the watts required for the charging of 176 retorts at less than 2400. The coal-elevator and the conveying plant take together only about double this quantity, working some ten minutes after each charge. The amperage required does not exceed 20 ampères × 120 volts. The lamps, being 6 ampère ones, want 6 × 6 ampères × 120 volts an hour, or 4320 watts." On the same subject, Mr. W. J. Jenkins writes: "It is difficult to say exactly how much current is used for the whole installation

owing to the very intermittent nature of all the work, except the lighting, and that varies with the season and the weather. But as regards the charging-machine, it is easy to show that the maximum current required is under two-kilowatt-hours for the twenty-four hours. The machine runs for five minutes per draw, and there are twelve draws per day; so that the machine is working for only one hour out of the twenty-four. The current averages 17 ampères at 110 volts, or 1·87 kilowatts. This at 4d. per Board of Trade unit, if taken from a public supply, would cost about 8d.; or, if produced as at Bruges by a gas-engine, it would not exceed 1¼d. per unit, including all charges and interest, or a total cost of 2½d. for charging all the retorts per twenty-four hours."

OBITUARY.

Mr. JOHN CUTHBERT, who was for many years Manager of the Dunbar Gas Company, and who was obliged to relinquish the position in 1892, six years after the transfer of the undertaking to the Corporation, died at Dunbar on Sunday, the 22nd inst., in his 83rd year.

PERSONAL.

We learn that Mr. H. C. SHEPHERD, who was the Manager and Secretary of the Old Swindon Gas Company, will succeed Mr. F. G. Cockey in the position recently vacated by him in the Amalgamated Company.

Owing to ill-health, Mr. EDWARD LONG has resigned the position of Manager and Secretary of the Sutton Valence Gas Company, Limited, which he has held for nearly forty years, having assisted at the formation of the Company in 1866.

To-day Mr. ALFRED BONHAM CARTER, who for nearly forty years has held the post of Official Referee of Private Bills, will retire; and it is understood the vacancy will not be refilled, but there will be a re-arrangement of the duties of the existing staff.

Mr. REGINALD R. STODDARD, of Manchester, has been appointed Manager of the tar-works of the Halifax Corporation. Some of our readers may possibly remember that Mr. Stoddard read an interesting paper before the Manchester and District Junior Gas Association last September on the "Manufacture of Sulphate of Ammonia."

Readers of the "JOURNAL" are aware that Mr. THOMAS CANNING, Assoc.M.Inst.C.E., the Engineer and Manager of the Newport (Mon.) Gas Company, takes a prominent part in all questions of education in the borough, having for some years occupied the position of Chairman of the Technical Instruction Committee of the County Council. At a recent meeting of the latter body, they elected him as their representative upon the Court of Governors of the University of Wales.

A meeting of the officers and staff connected with the Edinburgh and Granton Gas-Works was held on Thursday night, in Milne's Hotel, Leith Street, when presentations were made to Mr. ALBERT MOORE (draughtsman) and Mr. WILLIAM C. BIRRELL (clerk), on the occasion of their leaving Edinburgh to enter upon new duties at Sheffield and at St. John (Canada), respectively. The Chief Engineer and Manager (Mr. W. R. Herring) presided, and in a complimentary speech presented a timepiece to Mr. Moore and a silver cigar-case and gold sleeve-links to Mr. Birrell. Suitable acknowledgments were made, and a pleasant evening was spent.

Mr. JAMES MANSERGH, F.R.S., ex-President of the Institution of Civil Engineers, and Engineer of the Welsh water scheme of the Birmingham Corporation, last Tuesday received the freedom of Lancaster, his birthplace. The Mayor (Mr. G. Jackson), in presenting the freedom enclosed in a casket, mentioned that Mr. Mansergh had acted for 360 municipalities in engineering undertakings. Mr. Mansergh, in reply, alluded to the influence upon his career derived from his association in school days with Sir Edward Frankland and Professor Tyndall. Earnest men were then, he said, beginning to think about the conditions under which poorer people lived; and measures of sanitary reform, including purer water supplies, were the result.

A movement is on foot for the purpose of presenting a testimonial to Mr. E. BOULNOIS, M.P. for East Marylebone, as a mark of the appreciation in which he is held by his constituents. Mr. Boulnois is a native of Marylebone, and has been associated with its public affairs for a period of forty years. He became a member of the Vestry in 1863, Chairman in 1868, Poor Law Guardian in 1867, Chairman of Guardians in 1874, Mayor in 1901, Chairman of Magistrates in 1886, member of the County Council in 1889, and Deputy-Lieutenant in 1888. Mr. Boulnois is Chairman of the West Middlesex Water Company and of the Staines Reservoirs Joint Committee. It has been decided that the presentation shall be a portrait painted by Mr. W. Ouless, R.A.

Last Tuesday evening, a numerous gathering of officials and workmen in the Engineer and Manager's Department of the Reading Gas Company took place in Cross Street Hall, for the purpose of making a presentation to Mr. HERBERT E. S. BAKER, on his retirement from the position of Engineer and Manager of the Company. Mr. C. H. Eves, the Outdoor Superintendent, occupied the chair. The gifts consisted of a marble timepiece from the officials and workmen in the Manager's Department, an illuminated address (signed by 203 subscribers) from those in the Manufacturing and Distributing Departments, and a framed enlarged photographic group of the official staff. The address conveyed the sincere regret of the subscribers at Mr. Baker's departure from among them, and expressed their respect and esteem for him, and their appreciation of his courteous and gentlemanly manner in all his business relations with them. They assured him that the earnest wish of all was that every success might attend his future course in life. The presentation was made by Mr. W. J. Smith, the works foreman, who referred in appropriate terms to the pleasant relations which had always subsisted between Mr. Baker and the employees of the Company from the time when, fresh from school, he first came among them. The Chairman added a few remarks in support of those made by Mr. Smith. Mr. Baker, who was deeply moved, expressed his sincere thanks for the presents made to him and for the kindly terms in which he had been referred to. He assured the donors that he should always remember with pleasure the years he had spent with them. The presentation was made in the interval of a smoking concert, which added to the pleasure of the evening.

The Price of Thorium.—Through a little abbreviation in the latest news to hand as to the movement in the price of thorium, this was wrongly quoted last week in pounds per ton. It should have been in marks or shillings per kilo; and therefore the rise—if the proposal came to pass—was from 40s. to 50s. per kilo.

Waverley Association of Gas Managers.—The 84th half-yearly meeting of this Association will be held at the Royal Hotel, Penicuik, on Thursday, the 9th prox., under the presidency of Mr. Laurence Bell. The programme consists of an address by the President, with an informal discussion thereon, and the appointment of office-bearers for the ensuing year. After dinner, there will be a drive to Roslin, brakes for which are to be provided by the Penicuik and District Gas Company, Limited.

Heat-Emitting Property of Radium.—M. Curie, a distinguished French physicist, recently communicated to the Academy of Sciences his discovery that radium possesses the extraordinary property of continuously emitting heat without combustion, without chemical change of any kind, and without any alteration in its molecular structure; also that it maintains itself at a temperature 2·7° Fahr. above its surroundings. Sir William Crookes, who has investigated this subject with the most brilliant results, gave a demonstration a few days ago before the Royal Society.

Premature Destruction of Wet Meters.—As the result of a number of experiments in connection with the above subject carried out by Herr Albrecht (an account of which is given in the "Journal für Gasbeleuchtung"), he comes to the conclusion that ordinary metals suffer oxidation in pure water containing either oxygen or carbon dioxide; that the fixed alkalis and their carbonates prevent the reaction; but that the chlorides, sulphates, and nitrates hasten it. If aqueous glycerine be used instead of water, the metals are almost entirely unaffected. Under normal conditions, the effect of oxygen or carbon dioxide upon the metal of a meter is but slight; but in the presence of solutions of neutral salts, which appear to act catalytically, an appreciable corrosion is brought about in a short time.

Preventing Stopped Ascension-Pipes.—An arrangement for obviating the annoyance caused by stoppages in ascension-pipes was recently described in the "Journal für Gasbeleuchtung" by Herr Burgemeister, of Celle. To the side of the top portion of the ascension-pipe (to the bridge-pipe, in fact) he attaches a small tube which descends about 16 inches from the juncture and then sharply turns upwards to a height of 36 inches, and ends in a cup. Into this cup water is admitted drop by drop, so that it is completely evaporated; and the cooling thus effected prevents the deposition of carbonaceous particles. When the method is first introduced, the deposits already formed in the pipe are loosened and flow downwards, so that it is frequently necessary to remove the greasy accumulation from the lower part of the pipe; but after this has been done, all that is needed is to clear the pipe by means of a cross-head at each charging of the retort.

A Bacteria Lamp.—Those of our readers who visited the last Paris Exhibition, and examined the contents of the Optical Palace in the grounds, will doubtless remember that there was a room lighted—not very brilliantly, it must be acknowledged—by luminous bacteria. The following year this phenomenon was brought under the notice of the Royal Society by Mr. J. E. Barnard and Dr. Allan Macfadyen, who at the *conversazione* in May performed several striking experiments with bacteria brought from the laboratory of the Jenner Institute of Preventive Medicine. The property possessed by these minute creatures to emit light has now received industrial application by Professor Hanos Molisch, of Prague, who has reported to the Vienna Academy of Sciences the production of a lamp lighted by bacteria. According to particulars which have reached this country, it consists of a glass vessel in which is placed a lining of saltpetre and gelatine inoculated with bacteria. Two days after inoculation, the vessel becomes illuminated with a wonderful bluish-green light, which, it is said, will burn brilliantly for two or three weeks, and then begin to diminish in brightness.

TECHNICAL RECORD.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Stretford Gas-Works.

In the absence of a special paper for their usual meeting last Saturday, the members of the above-named Association filled up an interesting and very profitable afternoon by a visit to the Stretford Gas-Works, facilities for which had been kindly afforded by the Engineer and Manager, Mr. H. Kendrick, the new Secretary of the Manchester District Institution of Gas Engineers. Notwithstanding anything but propitious weather, the members assembled in full force. After meeting with a cordial reception at the offices, they were conducted by Mr. Kendrick through all the departments of the works, special arrangements having been made for an inspection of some of the operations connected with gas manufacture. During the last few years the works have been largely extended, and have undergone considerable rearrangement with the object of introducing modern practice; further developments in the same direction being in progress. They therefore afforded an excellent opportunity to the members for studying the old and present methods employed in the production of gas.

From a description of the works which had been specially prepared by Mr. Kendrick for the guidance and information of the members during their visit, they learnt that the area supplied by the Stretford Gas Company comprises 19 square miles; the districts (which are mostly residential) including part of Stretford (including Trafford Park), Sale, Ashton-on-Mersey, Urmston, Flixton, Davyhulme, Crofts Bank, and part of Chorlton-cum-Hardy. The district supplied is practically level throughout; the greatest difference in any part not exceeding 25 feet. The works, which have no railway communication, but being situated on the banks of the Bridgewater Canal have excellent water communication with the collieries, are, as already stated, a combination of old and new; but a scheme is being gradually carried out for rebuilding the whole of the old portion, which it is anticipated will in the course of a few years bring them quite up to date in all particulars.

The first portion of the works to which the members were taken was the wharf on the canal bank, to which the greater part of the coal and cannel used is brought by barges. Here an elevator has been erected, by means of which the raw material is conveyed from the barge into the stores or the coal-breaker pits, whence it is again elevated by mechanical means into the storage hoppers in conjunction with the stoking machinery. The carbonizing plant was next visited. This consists of two retort-houses. The first contains four through beds of six retorts each heated on the direct-fired system; the second, eight through beds of eight retorts each, heated on the Klönne regenerator system, fitted with West's manual charging and drawing machinery.

In passing through the retort-houses, Mr. Kendrick stated that it was intended next year to pull down the existing direct-fired settings, put up in their place eight ovens of regenerative settings, and work the complete stack of 16 ovens by machinery. Before designing the furnaces, they had under consideration whether they should put in inclined in preference to horizontal retorts; but, at least for the present, the idea had been abandoned owing to the greatly-increased cost, which amounted to about double that of the horizontal settings. Any further retort extensions were to be made at right angles to the existing houses, and would probably be on the inclined system.

With regard to the condensing plant, which consists of two sets —one being the obsolete atmospheric type, and the other a new set of the water-cooled type—Mr. Kendrick said it was intended to take out the former, and put in its place more modern apparatus. There are three exhausters, each capable of passing 50,000 cubic feet of gas per hour. One of these is of the three-blade, and two of the four-blade type, erected by Messrs. C. & W. Walker, Limited. Of the two tower scrubbers, one is fed with liquor (the weak liquor being thus brought up to the required strength), while the other is fed with fresh water only. It is, however, intended, Mr. Kendrick explained, to instal a mechanical scrubber fed with fresh water only. The purifiers, which are eight in number, and of the water-lute type, are 20 feet square by 5 ft. 6 in. deep. Oxide of iron is the only purifying material used. This plant is to be taken out, and purifiers of the Green type put in, which will enable Mr. Kendrick to get into the same building double the purifying area.

As to other sections of the works, the visitors were shown the station meter, which is capable of passing 60,000 cubic feet of gas per hour, and is quite equal to present requirements. The storage accommodation consists of three gasholders. Two of them, each capable of holding 500,000 cubic feet of gas, have brick and puddle tanks, 102 feet in diameter by 24 ft. 3 in. deep. The third, which has a capacity of 1,120,000 cubic feet, has a brick and puddle tank 130 feet in diameter by 24 ft. 6 in. deep, is of steel throughout, and was built by Messrs. Clayton, Son, and Co., Limited, at a cost of £16,000. The steam-raising plant consists of two Galloway boilers, 28 feet long by 7 feet in diameter, with forced-draught furnaces. Steam-engines are used to work the exhausters, coal-breakers, &c., and a 15-horse power National gas-engine is employed to drive the elevators and conveyors for unloading the coal barges. The present offices, governor-house, stores, and testing plant are situated in the oldest buildings on the works; but Mr. Kendrick explained that these would be done away with in the scheme the Company are carrying out, and the plant accommodated in new buildings.

The visitors were next shown the carburetted water-gas plant, which was put in by the Economical Gas Apparatus Construction Company, Limited. The generating plant is capable of producing 500,000 cubic feet of gas per day. All parts, except the generators, coolers, and meters, are in duplicate, and each is capable of dealing with the requirements of two generating plants. The relief holder has a capacity of 400,000 cubic feet, and is arranged for telescoping. The purifiers are of the Green type, built in twin sections, and equal to purifying a million cubic feet of gas daily—both oxide and lime being used. The station meter will pass 30,000 cubic feet of gas per hour. There are two boilers of the Galloway type, each 24 feet long and 6 ft. 6 in. diameter, fired by forced-draught furnaces; and an economizer is employed for heating the feed water. The building has been designed to accommodate apparatus capable of producing 1½ million cubic feet of gas per day, and the present plant could be duplicated at an additional cost of about £4000.

Dealing with the distribution plant, Mr. Kendrick informed the visitors that the gasholder outlet-main was 30 inches in diameter, and fed four district governors, two being of Braddock's latest make, and the others of the old non-condensing pattern. The total length of mains in the four districts was 83½ miles; extensive enlargements and additions of trunk mains having been carried out during the past few years. As an indication of the growth of the Company, Mr. Kendrick mentioned that the total gas (all coal gas) made for the year ending Dec. 31, 1895, was 182,503,000 cubic feet, whereas in the year ending Dec. 31, 1902, the total make was 288,034,000 cubic feet, of which 61,013,000 cubic feet was carburetted water gas. At the present time the maximum output was 1½ millions per day, and the capacity of the plant 1¾ millions; and the suggested alterations of the retort-house would bring up the daily output to 2¼ millions. Their next step would be to double the water-gas plant, and bring up the output to about 2¾ million cubic feet per day. In seven years, they had gone up from 800,000 to 1,500,000 cubic feet, and the full capacity of their site was estimated at 5,500,000 feet. They had on their books 8706 consumers, of whom 758 were on the "slot" system. There were also 1318 cookers; the slot consumers and cookers having been added since 1896. From 1895 the capital account of the Company had been increased by £78,000, and now stood at £175,118.

On concluding the inspection of the works, the visitors were invited by Mr. and Mrs. Kendrick to refreshment, which had been provided in the Board-room. The President of the Association (Mr. Halliwell) said he was sure all the members had been most interested in their visit; and as they could not but most heartily appreciate the kindness shown to them by both Mr. and Mrs. Kendrick, he would ask someone to propose a vote of thanks to them. Mr. Garlick said he had great pleasure in doing so. In going through the works, they could see how Mr. Kendrick had overcome great difficulties in effecting the requisite developments which had been carried out. The visit would largely enhance their technical knowledge, and would stand out as one of the most pleasant of many similar excursions. Mr. Baxendale seconded the vote of thanks, which was heartily accorded. Mr. Kendrick, in reply, said that whatever had been done, either by Mrs. Kendrick or himself, had been done most willingly and with the greatest pleasure. He had been a junior himself, and a good deal of the information he had managed to absorb had been obtained not so much from the works at which he was engaged, as from others outside which he had an opportunity of visiting. If their visit that afternoon had been the means of furnishing information which would be of benefit to the members, he should feel amply repaid for any little trouble either Mrs. Kendrick or he had taken to receive them.

Before separating, a vote of congratulation was passed to Mr. E. J. Wellens on his appointment as Manager at the Hebden Bridge Gas-Works, and to Mr. R. T. Stoddard on obtaining the position of Manager of the residual products works of the Halifax Corporation.

The gentlemen named briefly acknowledged the vote, and the proceedings closed.

It is reported that Messrs Vickers, Sons, and Maxim have decided to commence making a special type of gas-engine for the utilization of blast-furnace waste gases.

At Wiesbaden, plant has recently been put into successful operation for the purification of water by means of ozone. It is in three sections. In the first, comprising the engines and dynamos, the electric current is generated for the ozonizers, which form the second section. When generated, the ozone passes into sterilizing towers (the third section), where it travels up through coarse gravel, while the water to be purified flows downward. The plant is equal to dealing with about 1½ million gallons daily.

NEW ENGLAND GAS ENGINEERS' ASSOCIATION.

Annual Meeting at Boston (Mass.).

The Thirty-Third Annual Meeting of this Association was held on the 18th and 19th of February—the President, Mr. W. E. M'Kay, of Boston, in the chair.

Inaugural Address.

The President commenced his address with a reference to the anthracite strike, which not only doubled and trebled the price, but at last rendered anthracite unobtainable on any terms. It extended over six months. In August, the price had risen to £2 11s. 8d. per ton, and in September to £3 12s. 6d.; but this was merely nominal, as dealers would not book orders. The colder weather led people to try other fuels, and the price of wood and oil advanced 40 per cent.; so that gas alone enjoyed the honour of an uninterrupted supply and a uniform price. In November, December, and January last, the output of gas increased at an unprecedented rate—the largest cities showing 20 and 25 per cent., and smaller ones even more. The operation of combined coal and water gas plants lessened the inconvenience of the anthracite shortage and the difficulty of meeting the increased demand. The coal strike had been such an efficient solicitor for new business, that they could afford to let the commercial side of the industry alone for awhile. It was creditable that in these trying times the demand was successfully met, and this without increase of price; and the general education in the use of gas for cooking and heating would render a large portion of the demand a permanency. The shortage was caused by a decrease of only 5 per cent. in the annual output of anthracite, showing that a serious economic disturbance can be brought about by a very slight difference in demand and supply; and prudence suggested the multiple equipment of plant, so as to be equal to all contingencies. Extensions and enlargement would be the general rule this season; and the experience of the past winter enforced the wisdom of making the new plant as ample as means would permit. The development of very deep purifiers had met with much approval. English and Canadian coal had reappeared in some works; and the experience of the past winter had established some relative values for water-gas making, in petroleum coke, Welsh anthracite, retort coke, oven coke, retort carbon, and even semi-bituminous coal. There was also some expectation as to Texas oil; but this did not give so permanent a gas as Ohio or Pennsylvania oils. According to the official reports, the residuals market was permanently satisfactory. Much had been done to educate coke consumers. The high-pressure system of distribution received well merited commendation; but several features were yet undetermined, such as the effect of compression upon candle power, the limit of profitable compression, and the flow of gas under high pressures. In Germany, 90 per cent. of the gas-burners were incandescents, and in England 50 per cent.; but in America flat-flames were still in the majority. More than half-a-million Welsbach mantles had, however, been sold in New England within the last six months; and the success of arc or cluster lights was phenomenal. He strongly recommended that gas companies should undertake the care and maintenance of appliances, including mantles. The number of gas-stoves used in Massachusetts had trebled within the last seven years; showing the effect of persistent educational work. A signal feature of the past year was the use of large gas-engines in central electric light stations. In the course of his concluding remarks, the President said that the publication of reports of their proceedings, both past and present, was a work that should be promptly undertaken; and he highly recommended a plan that would be proposed to the meeting, whereby the Association would secure head-quarters at an existing library.

The Membership—New Head-Quarters.

The report of the Secretary and Treasurer showed a total membership of 215, and a balance of receipts over expenditure for the year of £16. A special report from the Directors recommended that the publication of the proceedings in book form be proceeded with as rapidly as possible. From £40 to £50 a year would be available from the library fund, and £20 to £30 from the general funds; and contributions to the library fund would expedite the work. The Association had now an opportunity of acquiring head-quarters, and the use of an excellent engineering library in a central locality. For a payment of £20 per annum, they would secure the use of a reading-room at the premises of the Boston Society of Civil Engineers, accommodation for their own books, and the use of the Society's library. More than half their members lived within 40 miles of Boston, and three-fourths within 150 miles; so it was thought that this arrangement was desirable in the interests of the majority.

On the motion of Mr. Allyn, it was decided to postpone the matter to a later period of the meeting, so as to give the members an opportunity to consider and discuss it.

The Collection of Gas Accounts.

Mr. S. E. Baker, of Fall River (Mass.), read a paper dealing with the above subject. The application forms signed by each customer stated his occupation, in addition to his full name. This was useful for subsequent identification; and it was his rule not to accept an application signed by a female unless she was actually the responsible head of the house. It was the exception and not the rule to require a deposit. Every meter-card, besides the usual information, had two lines "Moved from" and "Moved to," showing if the consumer came from or removed to another part of the district. The collector was provided with a vowel index-book so that any name could be quickly found, in which all information likely to affect the consumer's credit was entered—such as the sending of cut-off notices or other proceedings to enforce payment. If the party removed and did not pay up to date, he was marked in the book as "owes gas;" and another meter would not be fixed elsewhere for him until the entry was erased. The ledger clerks were encouraged to keep their ledgers made up to date, and to keep the collectors informed of all in arrear. They sold stoves on the monthly instalment plan; and if any consumer failed to keep up his stove payments, the fact was recorded. As examples of the notes found in the collector's book, he might mention the following: "Always hard up," "Slow pay," "Keeps returning goods," "Drinking man." Small fittings and Welsbach goods were sold on cash terms, and a "past due" notice sent if unpaid in 30 days. If this was not complied with, the account was handed to the collector. If a meter was removed and the collector failed to get the account, a series of four notices were issued at weekly intervals.

The paper being declared open for discussion, Mr. Jenks said that he had to deal with the same class of population as the author, and had hitherto depended on a deposit system. But the paper had set him thinking, and it was possible there would be some revision as a result. Mr. Barnes was using a system similar to that described, but required a deposit or a satisfactory guarantee from all newcomers. His system of collection was much the same. Perhaps the author could give his percentage of bad debts. He did not, of course, require a deposit from the prepayment consumers; but he did require a signed agreement to the effect that they would be responsible for the safety of the contents of the cash-box. He would like to know what check there was on the honesty of a prepayment collector, and what could prevent him reporting a less amount than he actually cleared. He had about 400 prepayment meters out; and his plan was to have the indexes taken by the ordinary meter inspector—the taking being checked against that given in by the collector. He made it a rule not to set a prepayment meter in a position where anyone outside of the consumer and his household could get at it. Mr. Woodward said the author had described an excellent system; but what applied to a large concern did not equally apply to a small one. What the author carried through by printed records, &c., was usually done in a small concern by the ability of the cashier, who was expected to know all the consumers, their ability to pay, &c. The value of a good clerk or cashier lay just in that knowledge; and he found a lady in the office a valuable assistant. He thought most companies could keep their bad debts down to 1 per cent.; and for the sake of that 1 per cent., it was not worth while to adopt hard, rigorous methods that would offend many of the customers. Discount for cash was an excellent thing, as the discount collected the bill. With regard to the prepayment meters, he believed in frequent clearances. The President said that since the publication of the paper, many members had adopted some of the ideas advocated. He noticed two questions bearing on the subject had been sent in, and would take them in connection with the discussion. They were: "What methods are adopted to compare the cash takings with the registration of the prepayment meters?" and "How can a consumer be induced to read his own meter?" He thought Mr. M'Gregor and Mr. Nettleton could give information on these points. He would ask if there had been much experience in the way of robbing of cash boxes, or in the use of dummies instead of honest coin. Mr. M'Gregor said he had a card system by which the collector gave in the cash taken, and the meter-index. He had no losses, and had not found a further check necessary. Mr. Nettleton said he used books with perforated pages and divisions for each month. The collectors handed in their statement books every night, and the loose strips were torn out and filed; so that the next month they had practically an empty book, and nothing to guide them. He had successfully adapted the prepayment meter to the collection of stale arrears, by setting it at double rates. The consumer wished to pay but could not, and was willing to sign a form to the effect that half the contents of the till should go to reduce the old account, and half to pay for the gas used. Meters used in this way were painted blue; and he had at present 130 blue meters out. They must, of course, be fixed with the full knowledge and sanction of the user; and in each case he held a signed agreement to that effect. As regards checking the honesty of the collectors, he not only had the comparison between the cash and the gas shown to have been consumed, but every few months he changed the routes, so that a collector did not know what district he would be called upon to work. He cleared the boxes once a month as a rule, but twice or oftener if desirable. Mr. Coffin said that he sold 200 feet for a quarter, and the collectors were expected to take enough money to cover the quantity consumed—any overplus being left in the till. Thus the consumption for each tallied; and he collected over 100 per cent. The overplus was never an important amount. He had only known one case of robbery. His prepayment rate was 2½d. per 1000 cubic feet more than the ordinary. Mr. C. A. Learned said that

at Meriden he had 1200 prepayment meters, and checked the collectors by an independent reading once every six months. [At this point of the discussion, it was ascertained, by show of hands, that only two members charged a higher rate than the ordinary on the prepayment meters, and that only four had suffered actual loss by theft from the cash boxes.] Mr. Prichard said that, with regard to reading the meter by the consumers, what was wanted was an index that would show the actual sum due without calculation. Every quarter they all found difficulties due to the carelessness of meter inspectors or clerks. Something of the sort had been done with electricity, and found to greatly reduce the risks of error. Mr. Nute understood that such a meter was about to be put on the market. It would show, in addition to the usual reading, the actual sum due; and the cost of the additional mechanism was very little. Mr. Barnum said that at Danbury, Conn., the meters gave a direct indication in dollars and cents, because when the works were first started the price was $10 per 1000 cubic feet. When reductions were made, they took the form of discounts; and this plan was adhered to, although the discount was now very large. It was considered to be simpler than direct figuring. The Secretary asked how many of the gentlemen present took the trouble to read their own meters regularly.

Mr. Baker replied to the discussion, and said his bad debts were a mere fraction per cent., and less than £200 per annum. In reply to Mr. Woodward, he asked what would happen if the cashier left. They talked a great deal about educating the gas consumer, and he believed in educating him up to prompt payment, even if there was a little friction for a few months. The advantage of getting the money promptly was worth a little trouble. He kept a running account of the cash taken as against the indication of each prepayment meter; and if any discrepancy arose, it was inquired into. The routes were changed monthly; no collector going over the same ground two months running.

Gas Appliances.

A short paper dealing with gas appliances was read by Mr. H. K. Morrison, of Concord (N.J.), who enlarged on the importance not only of getting new business, but also of caring for the old. It was desirable to keep the capabilities of gas in regard to heat, light, and power well before the public; and no better way of doing this could be devised than seeing that every appliance was in efficient order. In considering the troubles usually called "complaints," he recommended the periodical inspection of gas-stoves, not by a gas-fitter, but by a skilled cook, who, with tact and common sense, could go behind the scenes; and a careful inspection of gas-engines by an expert in that line. Appliances frequently remained out of use for weeks, or were eventually rejected, through a little defect that could be set right in ten minutes.

(*To be continued.*)

GERMAN PROGRESS IN THE RECOVERY OF CYANOGEN.

(*Continued from p. 769.*)

Leaving for the time being Herr Feld's work on the means which may be employed for extracting cyanogen compounds from coal gas and other fuel gases, an interesting article by Dr. A. O. Nauss, of the Carlsruhe Gas-Works, may next be cited.

He reports that two years ago he had occasion to carry out investigations on the amount of cyanogen in the gas at different stages in the course of its treatment on the works. Though the results must be regarded as only approximate, they throw light on the yield which was obtained by the old process of recovery from the spent oxide, and show how much more rational is recovery by the wet process. Tests were made on the gas after it had passed through (1) the Pelouze tar-extractor; (2) the washers and scrubbers; and (3) the purifiers. The scrubbing plant consisted of two sections, each comprising four washers packed with wooden grids and wood shavings; the first three being sprayed with gas liquor by means of Eisel's sprinkling jets acting on the reverse flow principle, and the last one being sprinkled with clean water with Zschokke's dripping apparatus. The results obtained at various times were as follows:—

At the Outlet of the	Ounces of Cyanogen per 1000 Cubic Feet of Gas.	
Pelouze tar-extractor . . .	1·30 1·55 1·92 1·80 1·56 1·38 Mean	1 59
Last scrubber	1·22 1·30 1·32 1·04 1·30	
,, ,, (more liberal washing)	0·86 0·80 0·86 1·17 1·04 0·95	,, 1·10
Purifiers	0·15 0·10 0·13 0·08 0·06	,, 0·10

The maximum of 1·92 oz. of cyanogen per 1000 cubic feet was exceeded if there was only one tar-extractor in action. In that case, 2·08 to 2·12 oz. of cyanogen reached the scrubbers. It follows from the mean amounts found, that 0·49 oz. (30·8 per cent.) of the cyanogen remained in the scrubbers; that 1 oz. (62·9 per cent.) was retained in the purifiers; and that there was 0·10 oz. (6·3 per cent.) left in the gas. These results showed that the extraction in the purifiers compared favourably with the amounts commonly recovered in other works; but they further proved that over 30 per cent. of the cyanogen which entered the scrubbing plant was washed out there. Only a few statements have hitherto been recorded on this point; but they all indicate that but little cyanogen can be lost in the gas liquor, because, notwithstanding the high degree of solubility in water of the cyanogen compounds present in gas, hydrocyanic acid must be liberated again continuously, owing to the action of the carbonic acid that is present, and so must remain in the gas. Only the results obtained by Leybold and Drehschmidt need be quoted here by way of comparison.

According to	(1) Leybold.		(2) Drehschmidt.	
1000 cubic feet of gas contained cyanogen—	(*a*)	(*b*)	(*a*)	(*b*)
Before the scrubber . . . oz.	1·871	2·550	1·870	1·760
After the scrubber . . . ,,	1·736	2·516	1·749	1·705

It is not just to state generally, therefore, that the loss of cyanogen in scrubbing is only slight; and tests to be reported later will show that the statement is only correct in regard to cases where there are very active washers. In gas liquor from many works there are enormous quantities of ammonium sulphocyanide. Lunge reports in his "Coal Tar and Ammonia" (third English edition, p. 766) that many English liquors contain 20 to 30 grammes of ammonium sulphocyanide per litre (3 to 5 oz. per gallon).

A portion of the ammonium cyanide taken up by the gas liquor is converted by contact with the ammonium sulphide, especially in the presence of oxygen, into sulphocyanide, and is thus lost; while another portion combines with the iron of the connections to form ammonium ferrocyanide, which can then be recovered from the lime sludge of the liquor distilling plant in the form of the difficultly soluble calcium-ammonium ferrocyanide. An analysis of this sludge showed 2 per cent. of prussian blue. It must be remembered that though this quantity represents only a small percentage of the total cyanogen, the cyanogen occurs in this case in a form which is more readily worked up than is the cyanogen in spent oxide. By treatment with solution of caustic alkali, ferrocyanide solution is obtained; while prussian blue is precipitated by the direct action of acids. There are also a few processes for the recovery of the cyanogen which is often present in quite considerable quantities in gas liquor. Thus Professor Donath has drawn attention to Bower's English patent, according to which iron and iron salts are added to gas liquor, and ferrous cyanide is produced and recovered in the lime sludge. According to Wilton's method, solution of a ferrous salt is introduced into the scrubber with a view to forming ammonium ferrocyanide. But all these means appear not well adapted for attaining the object in view; and they are much too elaborate. The only proper means of avoiding all the losses of cyanogen is, according to Dr. Nauss, to absorb the cyanogen by the wet process.

This process has not, up to the present, been adopted at Carlsruhe, and other means have been followed for overcoming the evils. The extensive removal of cyanogen appeared to be due to the gas passing in the washers over surfaces partly wetted with strong gas liquor; consequently, it seemed likely that a highly efficient washer would be a great advantage. A trial was made with only the last Zschokke washer, sprinkled with clean water, in action; and observations were made which showed that it did all that was required in regard to the washing of the gas. This washer was 26 ft. 7 in. high, and 7 ft. 4½ in. in diameter. The maximum amount of ammonia ever in the gas after this washer was 4·4 grains per 100 cubic feet, and generally it ranged from 0 to 2·2 grains, even when the maximum quantity of 560,000 cubic feet of gas per diem was being passed through the machine. The gas liquor reached a strength of 3° to 4° Béaumé, and contained 1750 to 2450 grains of ammonia per gallon. The water used amounted to 0·50 to 0·62 gallon per 1000 cubic feet of gas washed. The Zschokke washer answered quite well, even in the summer; so that the remaining three washers in each section at Carlsruhe have now been quite shut out. The abolition of washing with ammoniacal liquor had a very marked effect on the absorption of cyanogen. Compared with the former loss of over 30 per cent., there was now only the very trifling loss of about 1 per cent. It may therefore be concluded that the more efficient the ammonia washer, and the shorter the way which the gas has to traverse in it, the smaller will be the loss of cyanogen. This fact appears to be of great importance in regard to the question which of the two more important wet cyanogen recovery processes—*i.e.*, those of Knublauch and of Bueb—should be adopted. If the loss of cyanogen in the scrubbers is inconsiderable, the two processes are on an equal footing; but if the loss is large, and for any reason the scrubbing plant cannot be altered, then Bueb's process should be given the preference.

The recovery of cyanogen in the wet way may be regarded as consisting in bringing the gas in intimate contact with liquids containing substances in solution or suspension which combine with the cyanogen to form liquid or solid products. So far as the mechanical arrangements are concerned, any washer, with or without mechanical action, will really serve; but care must be taken that large surfaces wetted with the absorbent are presented to the gas, and that no unnecessary back-pressure is thrown. Where air is added to the gas for the continuous revivification of the oxide of iron in the purifiers, it must be admitted after the cyanogen washers, as otherwise it gives rise to the formation of sulphocyanide.

(*To be continued.*)

PETROLEUM INCANDESCENT LIGHTING.

The paper at the Ordinary Meeting of the Society of Arts last Wednesday was contributed by Mr. ARTHUR KITSON, the inventor of the high-power incandescent system of oil lighting which bears his name. Readers have been interested in this system of lighting on many occasions; and it is always well for gas engineers to be kept posted in all that is being accomplished by the several methods of lighting—whether gas, oil, or electricity. We therefore give some extracts from the paper, and a summary of the discussion which followed. The chair was occupied by Professor VIVIAN B. LEWES, who has frequently spoken of this light as an ally of the gas industry in competition with the electric light, and has highly commended it as a cheap source of illumination.

In the first part of the paper, Mr. Kitson showed that practically all the great achievements in artificial lighting have been accomplished during the last thirty years—achievements which transcend all that was previously accomplished in this art during the world's history. Those whose memories fail to carry them back twenty-five or thirty years, can satisfy themselves as to the progress made by comparing the lighting of some of the residential streets in Paddington, Marylebone, and other districts, with the Strand, Piccadilly Circus, or Regent Street on a week night. However, notwithstanding the great improvements in the methods of producing light, it is principally upon the commercial localities, the business thoroughfares, and the well-to-do, that these benefits have been conferred. The masses of the population here and abroad are still using the old oil-lamp. It is estimated that quite 10 million oil-lamps are lighted in Great Britain every night; and an average of 129 persons die annually from accidents arising from their use. In fact, there are more oil-lamps manufactured and sold now than at any former period. The number of oil-light consumers still outdistances those of electricity and gas combined to a very large extent. Admitting the vast progress made in gas and electric lighting, in one sense both have stopped short in the fulfilment of their mission. They have not yet come within the reach of the majority of the poorer classes for domestic purposes. Among these, the oil-lamp still holds its own, for in point of cheapness it surpasses both. The author refers, of course, to the ordinary oil-lamp having a wick and glass chimney. In the poorest dwellings one or two lamps constitute the entire lighting "plant;" and obviously it would not pay a gas or electric light company to run pipes and wires and put in meters for so small a consumption of light. In fact, the use of the modern gas and electric lamps could not have been even as general as they are but for the growth and distribution of wealth among the middle class. High candle-power lighting is still a luxury.

In the competition among artificial illuminants, it has been interesting to watch the advantages gained first by one system and then by another, until an efficiency has been attained which even ten years ago would scarcely have been credited. Until quite recently, the contest seemed confined to gas and electricity. But within the last six years acetylene has claimed a place in the race; and, thanks to the invention of Welsbach, oil has been brought to a position where it is regarded as a serious competitor by its two more popular rivals. It sometimes happens that, in solving one problem, the inventor provides the means for solving several others, and in discovering and perfecting the means for improving gas lighting, and placing it on a level with—if not ahead of—electric lighting, Dr. Auer von Welsbach opened the way for improving oil lighting, and bringing it up to a similar level. It was pointed out many years ago by Dr. Frankland and others, that in ordinary gas lighting there was an immense waste of energy—that the amount of heat energy given off by the ordinary gas-flame was out of all proportion to the illumination produced. To remedy this, various enriching gas-lamps were brought out, the object of which was to supply the gas-flame with a larger proportion of hydrocarbons (such as vapours of naphthalene). It was found that the greatest efficiency was produced by converting the gas completely into a heating flame—on the bunsen principle—and then employing this to heat some suitable refractory material to incandescence. It is interesting to notice the revolution that has occurred in the use of gas for the production of light during the past few years. More than fifteen years ago the author called attention, in a paper read before the Franklin Institute of Philadelphia, to the fact that a much greater amount of illumination could be obtained from illuminating gas indirectly by transforming its heat energy into electric energy, and so furnishing the electric light, than by burning the gas direct. This efficiency has, however, been vastly increased by the use of the incandescent mantle.

It is but fair to say that, had it not been for the discovery by Dr. Auer von Welsbach, of the thorium-cerium mantle, the incandescent petroleum light would probably never have been heard of. In the author's first experiments, made during the years 1885 to 1887, he used a platinum gauze mantle. This method of producing light he discovered while carrying on some experiments connected with the production of a heating flame from oil. He vaporized a heavy oil—having a flash-point of about 200°—and mixed it with a current of air obtained from an ordinary Sturtevant blower. The result was a flame of intense heating power. It occurred to him that the application of a platinum gauze mantle would furnish a brilliant light. The experiment proved successful; and he then devised an apparatus which could be used as a lamp where the vaporization of the oil and the current of air were provided automatically by the operation of the lamp itself, without the use of a blower. The heat necessary for vaporizing the oil was readily obtained from the mantle or burner itself, and the principle of the bunsen burner naturally suggested a method for obtaining the necessary mixture of air and oil vapour.

The author then described his original form of lamp, and his experiments with the use of platinum mantles, which he was soon convinced were totally unsuited for practical purposes. It was through inability to procure a serviceable mantle that he was compelled to lay the experiments on one side; and it was not until the recent improvements in the art of mantle making—due largely to the later discoveries of Dr. Auer von Welsbach—that he was enabled to produce a lamp suitable for public use.

A petroleum incandescent plant consists of: (1) A closed tank or reservoir to hold the oil under a pressure of from 40 to 60 lbs.; (2) the lamp, consisting of a burner and mantle, vaporizer, and mixer; and (3) the tubing for conveying the oil from the tank to the lamp.

The tank is preferably seamless, and made of sheet steel, pressed out of a single sheet by hydraulic pressure, with the bottom turned in and brazed. These tanks are manufactured in the United States, and are remarkable examples of the development of the hydraulic press for metal work. The author's experiments with containers showed that riveted tanks are not wholly reliable. Out of one hundred riveted tanks tested, more than half leaked with an oil pressure of 100 lbs., and 70 per cent. leaked when the pressure was increased to 150 lbs. Each of the seamless tanks is subjected to an oil pressure of 300 lbs. for 24 hours before being put in public use. It may be of interest to learn that so far no English firm has been found able to manufacture these tanks at any price approaching that for which they are sold in the States. As a part of the oil plant, the tank is provided with an oil-level gauge, and an oil-pump for refilling.

The essential features of the lamp are (1) the vaporizer adapted to receive heat sufficient to vaporize the oil. (2) The mixing-tube in which the vapour is mixed with a sufficient amount of air (and no more) to ensure proper combustion. (3) The burner containing the mantle.

The vaporizer is the most important and troublesome part of the installation. In reality it is a miniature gas-works, in which the oil is converted from a liquid to a vaporous or gaseous condition. The process is invariably attended with the deposit of carbon, the amount of the deposit being proportional to the density of the oil, and the rate at which it is raised from the atmospheric temperature to the point of vaporization. The more sudden the operation, the greater the deposit. If it were practicable to conduct the oil through a great many feet of piping which increased in temperature at a gradually and regularly increasing rate, so that the molecules had sufficient time to re-arrange themselves, the precipitation of carbon might be reduced to practically an inappreciable amount. Practice forbids this; and the vaporizer is seldom more than one foot in length. The oil is therefore projected at atmospheric temperature into the vaporizer, which is just below a red heat, and the oil is immediately broken up into a series of compounds—some of which are fixed gases and others unstable condensable vapours.

The result of this is a precipitation of carbon which very soon clogs up the vapour-tube and chokes the small hole through which the vapour escapes. It is this difficulty which has been the hardest to overcome in making the system commercial. Obviously, a lamp that is liable to extinguish itself after an hour or two's burning is not likely to become popular. In experimenting with a view of overcoming this difficulty, the author discovered that the carbon collected on the cooler of two surfaces; and he found that by placing a rod or tube in the centre of the vaporizer, the carbon would deposit on this, instead of on the walls of the vaporizer. By taking out this rod occasionally, it is a simple matter to clean and replace it. The one essential feature of a successful incandescent oil-burner is a vaporizer that can be cleaned or replaced quickly and easily.

Another important feature is the lighting of the lamp. Before a lamp of this type is ready for use, the vaporizer must be heated to the temperature at which the oil vaporizes; and if this operation is very troublesome or takes a long time, the system cannot be considered practicable. He has, therefore, made the vaporizer as small as is consistent with the proper supply of vapour, and with the walls as thin as is consistent with strength and durability, with the result that the ordinary lamps are lighted in a few seconds. The vaporizers, as now constructed, require cleaning about once a month, and in some cases they will run as long as three or four months. It is obvious that the vaporizer may be placed in many positions where it will receive the heat of the mantle or the burner. In some cases the vaporizer is placed inside the mantle, sometimes below, sometimes above, and at the side. For lighthouse purposes and photographic work, it is advisable to have no overhead obstruction, so that all the rays of the mantle may be effective. To this end, the vaporizer is placed below the mantle, and is heated by a jet taken from the vaporized oil and air on its way to the burner.

By samples of the tubing, the author showed through how small an orifice the oil may be supplied sufficient for one or more lamps. The largest tube that he has ever had occasion to use

was but $\frac{1}{16}$ inch inside diameter; and this furnished oil sufficient for over 100 lamps of 1000-candle power. All the joints in the tubing are carefully brazed, except where it joins the vapour tube and tank. Small screwed unions are used at these points. Each tank is provided with a filter composed of cotton waste, silk, gauze, or some similar straining device, so that there is no chance for any particles to lodge in the tubing and clog it.

In the lighting of buildings or open spaces, a number of lamps can be operated from one tank. At the Philadelphia Export Exposition, in 1899, 100 lamps were supplied from one tank. As an illustration in the economy of floor space, it may be interesting to know that a space of 10 square feet was all that was required for furnishing light equivalent to 200,000-candle power, equivalent to 200-horse power in electric energy. Contrast this, said the author, with the space required for a gas-works, or an electric light plant (with its boilers, engine, dynamo, &c.) to furnish a similar illumination; and it will be seen that, in this respect at least, the oil incandescent plant is a great economizer. Another feature of the system is that the oil can be carried for a considerable distance by means of pipes. It is, in fact, quite practicable to supply small villages and towns from a central reservoir, and to run the oil-pipes and tubes into private houses similar to the manner in which water or gas is now supplied.

Speaking on the question of safety, the author stated that out of the many thousands of installations of the system that have been made in the United States, this country, and throughout the world, he has yet to hear of a fire originating from its use. In this respect no other method of artificial lighting can compare with it. He added: There is, among many people, a great superstition in regard to the use of oil; and we hear continually of the "deadly oil-lamp." According to statistics, the total number of deaths from accidents caused by oil-lamps during the past eight years in this country is about 129 per annum. This is considerably less than the number of people who die annually from falling down stairs; and yet we do not hear any complaint about the "deadly staircase!" As Dr. Boverton Redwood has stated in his work on "Petroleum," it would be just as reasonable to introduce a measure to stop the building of staircases, as it is for the oil agitators who are continually advocating legislation, to prevent the use of certain grades of oil. The danger is not with the oil, but with the cheap and flimsy lamps that are sold; and if the efforts of those who are desirous of saving life were directed to improving the method of burning oil and to educating the users of oil-lamps in the manipulation of them, much more good would be accomplished. The use of oil is certainly no more dangerous than the use of gas. The oil used commercially with the Kitson system is known as kerosene. It has a flash test of 100° (Abel test), and a gravity of about ·8; so that it comes well within the limits prescribed by the Petroleum Act, and can be used without fear of danger.

One feature of the system is the necessity for pre-heating the vapour-tube before turning on the oil. Naturally, if the oil is admitted to the vapour-tube before it is raised to the temperature of vaporization, the oil will issue from the vapour-tube and very soon fill up the mixing-tube; and it would be impossible to produce any illumination in this way. Various plans have been tried for accomplishing this pre-heating. One is the application of an ordinary plumber's torch. Another plan is to connect the oil-lamp to the gas-piping, where gas is already introduced into buildings, and to use the gas in the form of a bunsen burner which is placed immediately at the side of or below the vapour-tube. In the United States, three-fourths of the lamps in use are lighted by this method, as there are few buildings in the large cities unprovided with gas. Another method involves the use of a carburetter, and the production of what is popularly known as "air gas." This is conveyed to the bunsen underneath the vapour-tube; and it acts precisely as the ordinary gas-flame. By this system, any number of lamps may be started at once. For convenience, a switch-board is provided at any suitable point, and the oil and air gas valves arranged in conjunction with a sparking-coil. The air gas is then turned on at the switch-board; and a spark from the battery immediately ignites it in each of the lamps. At the end of a few seconds, the oil is turned on, and the lamps are in operation. This system makes the ignition as simple as that of ordinary gas. Still another method is the application of an electric heating device. Some years ago the author arranged a platinum wire in the vaporizer itself, and connected it to an electric lighting wire. The heat of the platinum wire was sufficient to vaporize the oil as soon as it was turned into the vapour-tube. The latter method is only applicable where a current of considerable strength is procurable. Other plans have also been tried, such as the use of the ordinary wick oil-lamp, for heating the vapour-tube. But the simplest method is the gas or carburetter system. In the street lamp the base of the post contains the oil-tank, together with the battery and sparking-coil for starting the lamp, and the tubing runs up through the centre of the post.

In the next part of the paper, the author gave a great deal of information regarding the application of the lamp to lighthouse illumination, photography, heliography, contractors' work, and domestic purposes. Then he came to the "advantages" of the system, which he described as follows: (1) The absence of unconsumed products of combustion. (2) Its great economy. It is found that the average consumption of oil per 1000 actual candle-power per hour is about $\frac{1}{12}$ gallon. Naturally the relation of candle-power to consumption of oil depends on the quality of the oil, and varies with the gravity. The following is a comparison of candle-power cost furnished from different sources:—

COMPARATIVE COST OF VARIOUS LIGHTS.

Description of Light.	Average Candle Power.	Gas per Hour Cubic Feet.	Cost per 1000 Candles per Hour in Pence.
Petroleum (wick lamps)	32	—	12·5
Electric incandescent	15	—	15·2
Electric arc	1000	—	3·5
Fishtail (gas)	15	5·0	12·5
Argand (gas)	25	8·8	10·0
Regenerative (gas)	430	81·0	6·6
Welsbach (gas)	50	3·9	3·2
High pressure (gas)	275	11·0	1·6
Kitson	1000	—	0·8

It will be seen that this system of consuming oil is far cheaper than the old system where a wick was employed. (3) It has been remarked that the colour of the light more nearly approaches sunlight, and it enables one to detect different shades of colour better, than any other artificial illuminant. (4) For the amount of light, the volume of deleterious products is less than that from the old oil-lamps or gas. (5) The small amount of floor space required.

There is a type of domestic incandescent oil-lamp which remains to be explained. This is a sort of combination of the old type and the new. A wick is used for the purpose of drawing the oil to the burner. The burner-ring is in close contact with the wick, and, becoming heated, causes the oil in the wick to become vaporized. By the use of a long chimney, a draught is obtained, so that enough air is taken in to mix with the oil vapour to make a blue flame, which will raise a mantle to a considerable degree of incandescence without smoking. This lamp is useful where a small candle-power not exceeding 50 is required. The disadvantages are that it is easily extinguished; and it is quite unsuited to open spaces or where there is much air in circulation.

As to the best method for lighting streets, the author said he did not wish to make any invidious comparisons; but outside of the question of a good, reliable, effective, and brilliant light, that of the method of installation is a serious one. Any system that requires periodically the tearing up of streets must necessarily be a costly one for a city like London, with its narrow thoroughfares and enormous traffic. What the cost has been to London during the past three or four years, it will be impossible to estimate; but the actual expense involved in tearing up the streets and laying mains must be a mere fraction of that entailed on business by reason of the stoppage of traffic. The oil system offers a solution of this difficulty, since it presents a method for supplying each lamp with its own illuminating material. It further meets one objection to central plant lighting—viz., that interference with the plant or with the mains is likely to put the whole district in darkness. It has been estimated that the streets of London could be lighted by the incandescent oil system for less money than it now costs annually for tearing up its roads and interfering with the traffic. He has been asked repeatedly why there are not a larger number of incandescent oil street-lamps burning in this country. The answer is, the slowness of this country, particularly municipal councils, to take up new things. Only those who have had experience in such matters can realize the enormous amount of inertia existing in English public bodies. It takes a generation to overcome prejudice against what are termed "novelties." Further, in nearly all municipal bodies there is a considerable amount of self-interest displayed. A director of a water or lighting company finds he can protect his company's interests by getting elected to the Borough Council; and the author presumes there is scarcely a municipal body in England that does not contain a representative of some public supply company. When proposals from rival systems are made, these gentlemen are prepared to fight them from their incipiency. He mentions this as it largely explains what the public do not seem to appreciate—viz., the difficulty of introducing municipal improvements.

A good deal of criticism has been made by opponents as to the attention the incandescent oil-lamps require. The author is free to admit that the oil-lamp is more troublesome than a gas-lamp, and that it needs more careful attention; but, since there is no central station and no underground work in connection with the oil-lamps, the total amount of labour is less than that required by a gas or electric light plant of equal illumination.

In conclusion, Mr. Kitson said that while he does not anticipate the extinction of electric and gas lighting by the introduction and development of incandescent oil lighting—in fact, he does not believe that it will seriously affect those industries except to stimulate gas and electric engineers to greater achievements in the economic production of light—he does claim that his system of lighting has obtained a permanent place in the field of artificial lighting, and that in practice the old and wasteful method of burning oil will become obsolete, and give place to the new system.

Discussion.

The CHAIRMAN said that they had listened to an exceedingly interesting paper. The whole tendency of the time was towards getting higher and higher units of illumination; and this invention

of Mr. Kitson really bid fair to play a most important part, and (what was more) to play that important part in a most unobjectionable manner. At the present time in improving the lighting of a street, they took the existing lamps, and put on them new lanterns, new burners, and new mantles. But even then they found the dose of light was not enough to satisfy their palates, which day by day were getting more hardened by the effect of high-power lighting. Then they yearned after something more dazzling and stronger. The result was the streets were torn up, and the commercial residents in the neighbourhood involved in an enormous amount of loss, in order to introduce the electric light. Then, when put up, they were told the electric lamps were giving a light of 1000 or 2000 candles; but, when they looked at the light, they had grave doubts as to whether the supposition was borne out by fact. When one saw an electric lamp, which was known to be only blinking with about 250-candle power, foisted on the public as of 1000-candle power, those who were connected with the gas industry (as he felt that he was), often wished that they had the same latitude in the rating of their lighting as was possessed by the electric lighting industry. The Kitson light was not only an honest light in respect of its lighting power, but it was also a light which could be installed without the terrible interruption to traffic, and the terrible loss of money, which the continual tearing up of the streets necessitated. From this point of view alone, they (and particularly the people of London, who had smarted so much through the upheaval of the streets) owed to such a system as this a debt of gratitude, seeing that it might save them much of this sort of thing in the future. The light was of exceedingly good quality. He had often pointed out that in incandescent gas lighting, the higher the temperature that incited the incandescence—the higher the candle power obtained from the mantle—the whiter the light became, and the nearer it approached a true white light. The high-pressure system of incandescent gas lighting was well adapted for colour matching; and the Kitson light approached that same degree of purity of light—in fact, the large amount of heat that was inciting the mantle undoubtedly gave the Kitson light an enormous advantage in colour. In the course of some references to the use of the oil-lamp in the houses of poor people, the Chairman also remarked that this field had only quite recently been attacked by the introduction of slot gas-meters, which had unquestionably done a great deal towards ousting oil-lamps from small houses. This, however, would not disturb Mr. Kitson in the least, because it was in the direction of large-unit lighting that his light had such an enormous value. Street lighting on this system would not only be the cheapest, but it was the method that gave rise to the least disturbance. Mr. Kitson had pointed out that he did not think he was seriously threatening the gas or electrical industries. In his (the Chairman's) opinion, there was an ample field for all these lights; and they would naturally fall into their places. He himself believed and expected that within the next four or five years the Kitson light would be a big commercial success; and the field which it could, and would undoubtedly, occupy was a very wide one.

Mr. A. C. Brown inquired whether Mr. Kitson had tried materials other than the Welsbach mantle. He thought lime cylinders might be used as in the oxy-hydrogen light.

Mr. L. Gaster asked what price the author took per unit for electricity in computing the figures given in his table. In his (the speaker's) opinion, 3½d. per 1000-candle power for the arc lamp was exaggerated. There was no doubt the Kitson lamp possessed certain advantages; but he should also like to know at what price the author took the oil. At the same time, Mr. Kitson was to be congratulated upon his achievement.

Professor C. Le Neve Foster sought information as to whether the mantles used were the same as the Welsbach, and regarding the time occupied in heating up sufficiently for the vaporization of the oil. He thought the lamp would be very useful in lighting up large underground excavations—such as slate quarries in North Wales. A cheap, efficient, and powerful light such as this might mean not only a saving of expenditure, but a saving of life, as possible faults could be more easily detected and accidents prevented.

Colonel Allan Cunningham, referring to the domestic type of the Kitson lamps on view, inquired as to the method of igniting them; and also whether the author had any comparative figures regarding their cost and other forms of domestic lighting.

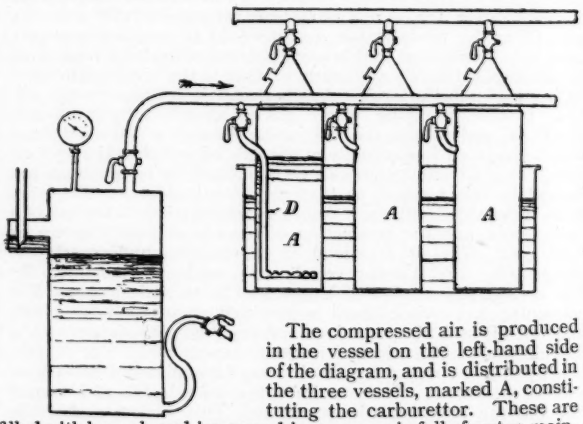
The Chairman said one other point occurred to him. Mr. Kitson had told them the flash-point of the oil employed in this lamp was 100°; and it occurred to him (the Chairman) that Scotch oil would be excellently adapted for the lamp. He should like to know the author's views on this point, because he had a sneaking desire to see home industries fostered. If the Scotch oil industry could be given a fillip by utilizing their high flash-point oil to a large extent, and taking up the residuums for liquid fuel purposes, it would be helping a deserving industry; and they would all be glad to see it done.

Mr. Kitson, in reply, said there had been considerable difficulty in getting a mantle sufficiently strong to withstand the transportation of the lamps from place to place. The mantle employed was not exactly the same as the ordinary gas mantle. Although they could, and often did, use gas mantles in the lamps, it was only for a short time, and then (for example) only in contractors' lamps. A contractor only wanted a lamp perhaps for a few hours; and then an ordinary gas mantle would be all that was required. But for public lighting, they used a much stronger mantle; and this mantle had an average life of one month—burning every night from sunset till morning. In fact, they had had them running three months in stationary lamps. In the domestic lamps, these mantles would also last from three to four weeks; this time covering the transportation of the lamp from room to room. The mantles were more expensive than the ordinary ones; costing about 1s. each. In even very exposed outside positions—for instance, at the Liverpool and Mersey docks—the mantles lasted, on an average, about a month. He had tried a lime cylinder as suggested; but the temperature of the oil-flame was not sufficient to warrant its use. They could get a light from it by increasing the pressure and the rate of combustion of the oil; but it would not be a commercially economical light. As to the price of electricity per unit, it varied in different localities; but in a large factory in the North, where current was generated for both lighting and power, the cost per unit was 2¾d., and at that place they were using Kitson lamps because they considered them to be much cheaper than electric lighting. He did not think even an electrical engineer would dispute that 3½d. per 1000-candle power was a fair average price. The cost of the oil used in his lamps was 8d. per gallon; but suitable oil could be bought as low as 6d. The time occupied in lighting up the lamps depended entirely upon the lamps themselves. The street-lamps were made to operate in about half-a-minute; while the contractors' lamps would take about a minute. The lighting of the domestic lamp was at present rather crude. It had to be done by methylated spirit. They had tried Scotch oil in the lamps; but, being heavier than the oil they ordinarily used, it necessitated a larger vaporizing-tube, which took a longer time to heat.

A hearty vote of thanks was passed to Mr. Kitson for his interesting paper.

LIGHTING BY CARBURETTED AIR.

In the "Petroleum Review and Mining News" for the 21st inst., an illustrated description is given of a process devised by MM. René Dior and Nicholas Beck for making illuminating gas by means of carburetted air. The liquid employed may be gasoline or 90 per cent. benzol (the latter is the cheaper), and the air is passed through it under pressure. In an ordinary carburetting vessel, the air becomes charged in a gradually diminishing degree, and after a certain time the gas is unsuitable for illuminating purposes. But it is claimed for the arrangement of MM. Dior and Beck, shown in the accompanying illustration, that this defect is remedied, and practically the whole of the benzol is utilized. The system is in operation in works which the inventors have fitted up near Granville, where there are two installations—one for 10 and the other for 30 burners.



The compressed air is produced in the vessel on the left-hand side of the diagram, and is distributed in the three vessels, marked A, constituting the carburettor. These are filled with benzol, and immersed in a reservoir full of water, maintained at a temperature of about 62° Fahr., in order to facilitate evaporation. Each vessel communicates by the pipe B, which is provided with a valve, through which the compressed air passes. Each of these pipes reaches to the bottom of vessel, and terminates at the lower end in a crown pierced with small holes. This arrangement allows the compressed air to escape in the form of bubbles through the liquid mass in each vessel. The air, charged with vapour, mounts to the top of the vessel, passes out through a pipe provided with a trap, and then on to the burners.

When starting work, the cocks of the burners being opened and those of the carburettor closed, the valve of the compressed air chamber is opened carefully, and the air allowed to enter from the blower into the pipe for distribution in the carburettors. Then the valve connecting the vessel on the left with the compressed air outlet-pipe is opened, and after this the valve that admits the compressed air into that vessel, when the different burners may be lighted. When the benzol in that vessel begins to get exhausted, the valve leading to the second one is opened; whereupon carburation takes place in the two vessels simultaneously. The illuminating power of the gas is 12 candles.

ANALYSES OF THE HEATHFIELD NATURAL GAS.

At the Meeting of the Chemical Society on the 5th inst., a paper on this subject was read by Mr. HAROLD B. DIXON, F.R.S., and Mr. W. A. BONE. The following are the principal portions of the communication.

When the possibility of the industrial application of the Heathfield natural gas was brought before the Royal Commission on Coal Supplies, one of the authors (Mr. Dixon, a member of the Commission) was asked to visit Heathfield and examine the nature of the gas on behalf of the Commission. Accordingly, several samples of gas were collected and sealed up in glass tubes on Oct. 10, 1902, and brought to Owens College for analysis.

According to Mr. Richard Pearson, Managing-Director of the Natural Gas Company, the gas was first discovered in 1836 in a well which was being sunk at Hawkhurst, in West Sussex. In the sub-wealden boring (1873 to 1875), the gas was met with at Netherfield, on the South-Eastern Railway. Gas was first encountered at Heathfield in 1895 in sinking a well for water in the hotel yard, about 50 yards from the station. In 1896, the same firm of well sinkers met the gas at a depth of 300 feet in a shaft sunk for water at the station. No water was found; but the gas continued to escape, and was used for lighting the station.

At the date of the above visit, six wells were either sunk or in course of being sunk, and gas had been encountered in all of them after the bores had penetrated through the 300 or 400 feet of surface bed of sandstone and marl which forms, according to Mr. Pearson, the impervious lid to the natural holder of gas. The gas was issuing from the boreholes at a pressure of between 140 and 200 lbs. per square inch, and was being used to drive gas-engines and to light (with incandescent mantles) the station and a number of houses in the village. When lighted at an inch pipe at the mouth of a borehole, the gas burnt with a large flame, giving a fairly good light; the flame being more luminous than that of fire-damp from coal mines. In an argand burner, the gas burnt with a moderately luminous flame, but gave little light in an ordinary batswing; so that it was difficult to understand how the gas could contain 5½ per cent. of ethylene, as was stated, unless, indeed, the free oxygen, also said to be present, was sufficient to destroy its lighting power. The analyses, however, showed that neither ethylene nor free oxygen was present in the gas collected. To avoid the possible loss of free oxygen by partial combustion in the tube while the drawn-out ends were being sealed, a sample was collected by closing the ends of the tube with paraffined india-rubber. It gave the same result. The gas was transferred by means of a Töpler pump from the collecting vessels into small tubes standing over mercury. The analyses were made over mercury in a modified M'Leod apparatus, all the reagents being freshly prepared.

A.—*Preliminary Examination for Carbon Dioxide, Oxygen, Unsaturated Hydrocarbons, and Carbon Monoxide.*

1.—The absence of carbon dioxide and oxygen was proved by exposing the gas successively to the action of (*a*) strong potassium hydroxide solution and (*b*) strongly alkaline pyrogallol solution. In neither case was there any appreciable absorption.

2.—The absence of unsaturated hydrocarbons was shown in two separate experiments in which samples of gas were successively treated with (*a*) fuming sulphuric acid and (*b*) strong potassium hydroxide solution. No change in volume occurred in either experiment.

3.—The gas always showed an appreciable contraction (as nearly as possible 1 per cent.) when successively treated with ammoniacal cuprous chloride and dilute sulphuric acid. No precipitate of cuprous acetylide was formed. Since the foregoing experiments exclude the possibility of this contraction being due to oxygen or unsaturated hydrocarbons, it can only be attributed to the presence of carbon monoxide.

B.—*Explosion Analyses for Saturated Hydrocarbons, with possibly Hydrogen, after Removal of Carbon Monoxide.*

After removing the carbon monoxide from a considerable volume of the gas (by means of ammoniacal cuprous chloride and dilute sulphuric acid), the contraction C, obtained on exploding measured volumes of the residual gas with a large excess of oxygen and air, was determined, and also the absorption A, when the products of explosion were subsequently treated with strong potassium hydroxide solution. The following results were obtained:—

	1.	2.	3.
Volume of gas taken (corrected)	48·250	55·700	58·750
Volume of oxygen and air added	457·450	468·300	465·450
C	94·350	109·100	115·200
A	48·250	55·900	58·800
C/A	1·956	1·952	1·959

C.—*Proof that the Gas does not contain Free Hydrogen.*

Before the foregoing results could be interpreted, it was necessary to ascertain whether the gas contained free hydrogen. This was done by exposing some of the gas, after removing carbon monoxide, to the action of "oxidized" palladium sponge at 100° for 20 minutes in an apparatus similar to that described by Bone and Jerdan,* and afterwards redetermining the ratio C/A, when the residual saturated hydrocarbons were exploded with excess of oxygen and air. The results obtained were as follows:—

	4.	5.
Volume of gas taken (corrected)	62·300	55·300
Oxygen and air added	472·500	493·000
C	121·800	108·200
A	62·200	55·400
C/A	1·958	1·953

A comparison of these numbers with those given above shows clearly that the gas contains an appreciable quantity of free hydrogen. The five explosion analyses indicated, however, the presence, besides methane, of a small proportion of some higher saturated hydrocarbon, which is probably ethane. Assuming this to be the case, the percentage composition of the gas, after removing carbon monoxide, calculated from the five analyses, is as follows:—

	1.	2.	3.	4.	5.	Mean.
Methane	94·10	93·88	94·40	94·30	93·90	94·10
Ethane	2·95	3·23	2·77	2·76	3·13	2·97
Nitrogen (by difference)						2·93

The original gas, therefore, had the following composition:—

Carbon monoxide	1·00
Methane	93·16
Ethane	2·94
Nitrogen, or other inert gas (by difference)	2·90

DISTRIBUTING GAS UNDER HIGH PRESSURE.

Recent issues of the "American Gaslight Journal" contain the address of the President of the Wisconsin Gas Association, Mr. F. W. Bowen, of Kenosha, and some of the papers read at the second annual meeting of that body, held on the 11th and 12th ult. One of the papers was by Mr. G. F. GOODNOW, of Waukegan (Ill.), who related his second year's experience in the distribution of artificial gas under high pressure. He had introduced the subject at the previous meeting, when a wish was expressed that he should give the members the results of his later observations; and he complied with it. The following are some extracts from the paper.

The most troublesome feature encountered during the year, and it may be said the only one, was electrolysis of the main line and service-pipes in certain districts in the vicinity of two power stations of an electric railroad. Some pipe which had been in the ground less than two years was perforated by this action, and permitted the escape of gas, though not in very large quantities. At one place the main was uncovered for 300 feet, and it was decided best, after inspection, to cut out this section, and replace it with new pipe, which was done. Acting under the advice of Mr. J. M. Humiston, of Chicago, this section was boxed, and the boxing filled with tar concrete. After making an electrical survey of the whole line, Mr. Humiston also advised placing insulated joints, consisting of a piece of enamelled pipe 10 feet long, inserted in the main and connected with Dresser couplings. He further suggested placing a number of these insulators along the line at intervals, according to the strength of the current manifested in the electrical survey in the districts of danger. The efficiency of this mode of protection is demonstrated by another survey after the joints had been put in; and when it is said that before this treatment the amount of current passing from the pipe to the ground was, at a given point, 14 volts positive to track and 27 ampéres drained from the pipe into the track, and that afterwards the amount of current carried on the pipe was, at this point, 2 volts positive to the track and 2 ampéres drained from the track to the pipe, some idea of the efficiency of this treatment can be obtained. Bonding the pipe to the rails for establishing a return current cannot be recommended, because the action would be distributed over the whole pipe system; and while corrosion would not perhaps be so rapid in that case, the trouble would only be deferred, and probably be more widespread.

Difficulty with condensed water freezing in the main was mentioned last year; but this has not been experienced so far, and the means taken to prevent it are very simple, and have apparently been efficient. To repeat the conditions under which the trouble occurred. About 1000 feet from the compressors, the 4-inch main passes over a stone culvert, with less than 2 feet of cover; consequently this main lies in frozen ground for some distance, and at this point stoppage occurred by freezing. Immediately after the compressors, a pulsation tank collects a considerable portion of the condensed water. A drip was devised and placed about 400 feet from the compressors in the line. This drip was of the shape of a small horizontal boiler, 30 inches in diameter and 8 feet long, with a pipe entering and leaving each head near the circumference on the upper side—thus giving the condensed water a chance to drop about 24 inches to the bottom of the tank. Baffle-plates were inserted in this tank at right angles to the flow of the gas, causing the current to zigzag around

* Transactions of the Chemical Society for 1901, Vol. LXXIX., p. 1044.

the plates, and water to be deposited. This brings the bottom of the tank about 6 feet below the top of the ground, which effectually prevents freezing. A blow-off was placed in the bottom, and was brought to the surface, where a turn of a buried stopcock allows the condensed water to blow through in a few moments. As only a small amount of water has been found beyond this drip, it appears that the action is efficient; and that no stoppage from frost has occurred beyond this point is certain.

These are difficulties which we consider have been successfully overcome, and it can hardly be said that other difficulties have been encountered. All the troubles which were naturally prophesied by ourselves and others—such as decreased candle power, intermittent service, large leakage, unreliable regulators, defective compressors, blowing seals, burst meters, deficient capacity of the small pipes—have not been encountered; and the difficulties incident to operating with high-pressure compared with ordinary low-pressure distribution are much less.

The writer last year advanced the tentative opinion that a complete high-pressure system, with individual regulators before each meter or group of meters, was preferable to large district regulators controlling a considerable territory of low-pressure main with ordinary services and other fittings; and this opinion has been amply confirmed by the past year's operations. Very little low-pressure main has been laid. Extensions have been made almost entirely from the high-pressure pipes; even some territory in Waukegan adjoining the older low-pressure districts has been piped with small high-pressure mains, their construction and operation being entirely satisfactory.

There are about 175 lamp-posts located on this line, and the pressure at the burners is controlled in three different ways. Some of them are located on low-pressure mains which are controlled by district regulators. None of these services has ever been frozen, which is accounted for by the drying of the gas by compression, and the elimination of the water. About 25 or 30 more of the lamps are controlled by small individual regulators, placed either at the bottom or at the top of the posts. These are very similar to the house regulators, only much smaller, with ⅜-inch inlet and outlet, and the controlling diaphragm is only about 3 inches in diameter. This method of regulation is more liable to get out of order than the other. The third method is being used upon about 60 posts maintained by the Welsbach Street Lighting Company, who have manufactured a cock in connection with a street lighting mantle burner, using 3 cubic feet of gas per hour at 20 lbs. pressure. These lamps certainly give a brilliant light. A variation of 5 lbs. does not noticeably affect it; and the community in which the lamps are used are well pleased with the illumination of the streets. After six or seven cold nights, in which these lamps had not been used on account of moonlight, six of the 60 were found frozen in the capillary orifice, but were thawed out with little trouble. A few cases of frozen services, not exceeding a dozen in two years, have occurred on the entire pipe-line, which now feeds from 700 to 800 meters. These facts, and the observations regarding condensed moisture, lead to the belief that it is not necessary to lay the pipes very deeply in the ground, except for protection from mechanical injury.

Roughly speaking, a 1¼-inch pipe will carry as much gas as a 4-inch pipe under low pressure, and a 2-inch as much as a 6-inch pipe. All these conditions make it evident that the cost of construction for equal service is very much less; how much could only be calculated from local conditions. Whether it would be advisable to use high-pressure mains in large cities where the population is dense, has never been demonstrated in the distribution of artificial gas; but very considerable towns and cities have had natural gas for years contained in pipes under the streets at higher pressures than these. That it can be used in towns and cities of moderate size admits of small doubt in the mind of the writer, and none whatever when applied to the service of suburban localities and sparsely populated districts, of which every town and city has its share—indeed, it is the only method to profitably supply such districts with gas from a central plant. This pipe-line has satisfactorily demonstrated during the past three months that it can easily supply 100,000 cubic feet of gas per day, and 10,000 cubic feet as the maximum hourly output. This quantity was very easily transported; and that it would handle 50 per cent. more than this under a maximum pressure of 30 lbs. admits of no doubt. That 600,000 cubic feet have been sent through a 6-inch line three miles long without coming anywhere near its capacity, is known by the writer. These few examples of the capacity of high-pressure lines in the sizes mentioned enable one to form some idea of the quantity of gas that can be handled under such conditions, to say nothing of raising the pressure to 10 or 20 lbs. more, which the writer believes can be done without injury.

The average capacity of each stroke of a compressor has been carefully measured by pumping a considerable bulk of gas from the small holder; and the number of strokes recorded each day by an automatic counter, kept in a similar way to a station meter record, give us a fairly accurate idea of the leakage of the entire pipe-line. The amount is arrived at by subtracting the sum of the consumers' meters from the quantity of gas registered by the counter in the familiar way, like a station meter; and the amount lost during the last few months averaged about 3 per cent.

The amount sold upon this line during the last few months has been about 2½ millions per month. The average meter consumption in one district, which now contains nearly 400 meters, has been 35,000 cubic feet per meter for the year. The number of miles of pipe of different sizes—comprising 4, 2, and 1¼-inch—now in use, is about 28 miles. The pressure after the individual regulators, as well as that after the district regulators, varies so little during the 24 hours that the operation of stoves, Welsbach lights, &c., is very satisfactory, and is rarely subject to complaints, unlike those received with a low-pressure system, caused by considerable reduction at hours of greatest consumption and excessive pressure at times when the consumption is small. During the year complaints caused from faulty regulators have been very few; and I believe only two or three have had to be exchanged in order to be readjusted. The variation in candle power between the two systems of distribution of the same gas has been very slight; and it is the opinion of the writer that increased efficiency in illuminating and heating value, caused by the drying of the gas during the process of compression, fully sets off any decrease in these qualities from the deposit of illuminants by compression.

Finally, the operations of the system have been satisfactory. The amount of sales for two seasons in a scattered, thinly populated territory has been more than we had any reason to expect; the troubles incident to distribution have been less per meter than upon the low-pressure system; the supply for the last twelve months has not been interrupted for an hour for any reason; and the chief difficulties, mentioned in the first part of the paper, we think have been successfully overcome. If the system were to be constructed over again, no district regulators would be put in, and consequently no low-pressure pipe; and protection against electrolysis, of the kind we are now using, would be freely introduced.

REGISTER OF PATENTS.

Gas-Compressor for Use in Incandescent Gas Lighting.—Howell, H., of Brixton, S.W. No. 5868; March 10, 1902.

This is a modification of the arrangement of gas-compressing apparatus for use in incandescent gas lighting, as described in patent No. 16,780 of 1900; the object being to provide means for regulating and controlling the compression proportionately to the quantity of gas used, and with a minimum of storage capacity.

The patentee makes use of an accumulator comprising two vessels of approximately equal capacity—one closed at the top, and having gas inlet and discharge pipes connected to it, while the other is open to the atmosphere at the top. Both vessels are connected at their lower end, and are designed to contain such a quantity of water that, when gas is forced into the closed vessel, the level of the water will rise in the open vessel—the difference of the level in the two chambers determining the amount of compression to which the gas is subjected.

In connection with this accumulator or storage vessel, there is provided a compressing apparatus comprising a water-motor and a compressor proper; the latter being in the form of a double flexible bellows having an inlet and discharge valve at each end, connected respectively with the gas supply and with the closed vessel of the accumulator. These inlet and discharge valves are provided with flexible leather or rubber diaphragms working freely in suitable chambers without friction.

The water-motor is supplied through a cock connected with a float in the open vessel of the accumulator, and having combined with it a weight capable of operating the valve, but balanced by the float in such a manner that when (owing to the rise of the water in the open vessel) the float is lifted the weight will close the valve; while when the water-level in the open vessel drops, the float overbalances the weight and again opens the valve.

Distillation of Ammoniacal Liquors.—Wilton, G., of Beckton, E. No. 24,832; Dec. 5, 1901.

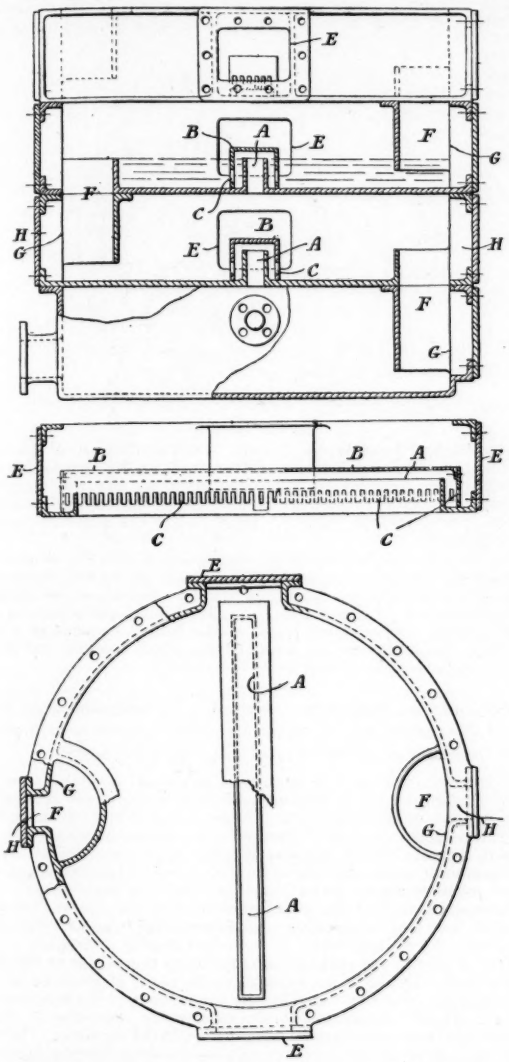
The patentee points out that the apparatus commonly used for the distillation of ammoniacal liquors consists of superposed circular trays or chambers constituting a tower; each tray or chamber being provided with a pipe extending for a suitable distance above and below the bottom of the tray—the upper end passing up to a suitable height above its tray (to ensure a proper liquid level therein), and the lower extremity reaching down to approximately the liquid level of the tray next below. Each of these trays has a central opening to allow the steam by which the distillation is effected to rise up through the series of trays. Over the steam-orifice of each tray is mounted a circular hood or baffle, usually serrated at its periphery, and dipping below the level of the liquid in the tray. The ammoniacal liquor passes down by the pipes through the series of trays, and the steam rises through the trays—bubbling out under the edges of the baffles through the liquor, and thence rising to the next tray or chamber.

Apparatus constructed in this manner has, however, he points out, several defects. First, it is difficult to clean, even by the mudholes provided in the sides of the trays, because the chambers are necessarily shallow, and the pipes by which the liquor passes down from tray to tray extend up and down to the liquid level in each tray. Moreover, the hoods over the steam-openings are too large to be removed through the mudholes; and further, as these baffles are circular, and a considerable space exists between their outer circumference and the sides of the trays or chambers, a large amount of liquor flows around the baffle to the outlet of the tray without coming under the action of the steam.

It is the object of the present invention "to overcome these defects,

and to render all working parts of the apparatus accessible for cleaning purposes, also to increase the efficiency of the apparatus," which is shown in the engraving—a plan looking down upon a tray, which is shown partly in section; a sectional elevation, showing three trays mounted upon a suitable base; and a section of one tray.

The steam-openings A of the trays or chambers and the baffles or hoods B which depend into the liquor in the trays, are made of somewhat narrow elongated form, and extended across the full width, or nearly the full width, of the trays. The bottom edge C of the baffles may be serrated to facilitate the bubbling of the steam out from below the baffles and up through the liquor. The inlet and outlet openings F



for the liquor to and from each tray are at opposite sides of the baffle B, which thus constitutes a kind of bridge through or over which the liquor is compelled to pass in its passage through the tray from the inlet and outlet. The entire mass of liquor passing through the tray is thus "brought into intimate and thorough contact with the steam which passes through the baffles."

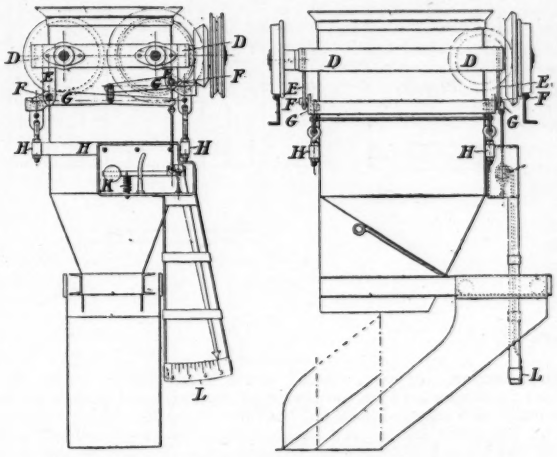
In order that the apparatus may be readily accessible for cleaning purposes, there is a mudhole E in the wall of the tray opposite each end of the elongated hoods. Through these mudholes the hoods can be removed when desired, as they are made with removable ends adapted to be bolted on or removed after the hood has been slid over, or before it is removed from, the upwardly projecting steam-pipe.

Further, with the same object in view, the inlet and outlet pipes for the liquor from tray to tray are formed as vertical channels or troughs F of half round section, arranged directly against the side walls of the trays, so that the walls (for instance, the portions G) form part of the walls of the inlet and outlet pipes. Mudholes H are also provided opening directly into the pipes or channels, so that by removing the mudhole covers the connecting pipes or channels can be readily cleansed.

Coal-Weighing Machine.—Denison, G. H., of Leeds, and Broadhead, J. W., of Elland. No. 6534; March, 18, 1902.

This is an arrangement specially suitable for use with an overhead coal-hopper—its main features (as shown) being a long downward-extending, self-acting, indicating pointer with creeping movement.

The measuring box is mounted on wheels for an overhead tramway. In a downward direction from the travelling frame D (which surrounds, without touching, the box), there are fixed four brackets or stirrups E, with eyes for taking four knives F, arranged on levers G, which so span round the box as to allow the knives to be arranged in suitable positions. The short ends of the levers are linked downwards, and are attached to two or more brackets H, on the measuring box. The longer arms of the levers are linked together, at the centre, at one side of the box; while the lower one is carried forward and linked downwards to the steelyard. The steelyard J is counterbalanced so that the measuring box floats at the desired position when empty.



In order to provide the visible creeping motion to the indicating pointer, there is a spring to govern the steelyard, after the manner shown at K; and, with a view of bringing the index further down, there is attached to the steelyard, near its fulcrum, a long downward-reaching arm, so that it may bring down and greatly magnify the weighing movements. The graduated scale L is attached to the foot of a special bracket M, which, carried up to a position overhead, is there fixed to the box, and forms part of the weight which requires compensation on the steelyard.

Purification of Gas.—Hills, H. G., of Ramsbottom. No. 7956; April 5, 1902.

The patentee proposes the elimination of the carbonic acid from gas manufactured from carbonaceous material "by bringing the gas into contact, by any suitable means and in any convenient way, with a solution consisting of chloride of sodium and water—preferably a saturated solution; the resultant chemical action being that the carbon of the carbonic acid combines with the sodium to form carbonate of sodium, and the ammonia combines with the chlorine forming chloride of ammonia. The carbonate of sodium is first precipitated in the form of a white powder or fine crystals, and is filtered off. The chloride of ammonia is extracted from the remaining solution by evaporation or distillation with an alkali, or in any other suitable way."

Gasholders.—Lambert, G. L., of Nottingham. No. 7398; March 27, 1902.

This invention has reference to improvements in and relating to gasholder tangential coupling-up girders between the main columns or standards, to the guides for gasholders, and to the cupping, luting, and plating or sheeting for gasholder tanks.

The first part of the invention relates to the method of connecting the tangential girders to the main columns or standards. This is illustrated by fig. 1. The main column or standard is provided at each position to which a tangential girder is to be connected with a facing and a foot or bracket for supporting the end of the tangential girder. The full length of the girder is less than the distance between the facings on

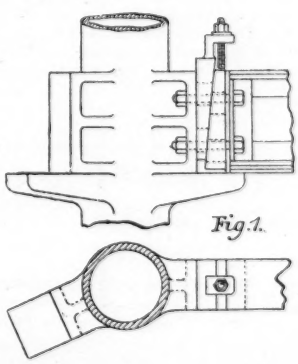


Fig. 1.

two adjacent columns; and the space at either or both ends is filled by wedge-shaped packings arranged as shown, and provided with a screw by which the relative position of the pieces can be varied according to the size of the space between the girder and the facing on the column. After the pieces have been adjusted, the girder is secured to the column by bolts and nuts.

The second part of the invention relates to the outside guides for gasholders; and this part is illustrated by figs. 2, 3, and 4. Wire ropes, solid or tubular bars of iron, steel, or other suitable material, of any

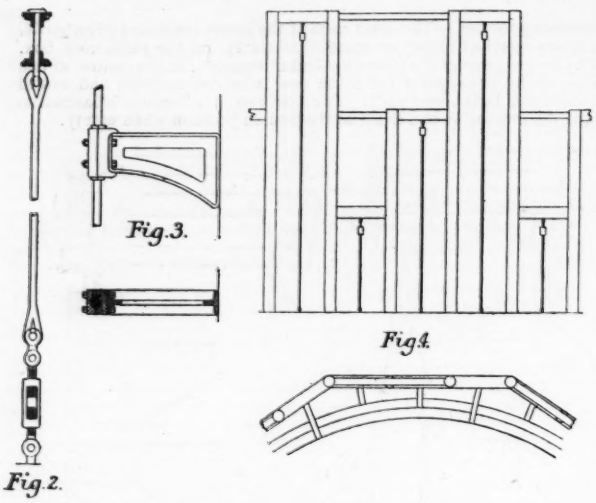


Fig. 2.

desired section, are used, instead of the usual channel irons. The guides are suspended from the centre of the tangential girders by an eye made with enlarged head and built into the girder during construction. The lower end of the guide is connected by a right-and-left-hand screw shackle to a holding-down eye-bolt built into the brickwork of the gasholder tank; and the upper screw of the shackle is connected to the guide by links. Each guide is fitted with a sliding bush (of ample wearing surface) in halves, and carried by a capped block which is adjustably attached to the guide-bracket firmly secured to the gasholder in the usual way. In fig. 4, there is shown diagramatically an arrangement of columns and girders by which the guides can be suspended from the centre of the tangential girders. The columns are of such a height that the guide is long enough for the inside holder. Between the columns is a short tangential girder, from which the guide for the centre holder is suspended; while the guide between the columns is long enough for the outer holder. With this arrangement, the length of the brackets varies according to the radial distance between the holders and the guides suspended from the centre of the tangential girders.

The third part of the invention relates to gasholder cups, grips, and lutes as shown in fig. 5. These are built up of two plates rolled to the section shown with flanges riveted together so as to form a circumferential joint, while the other edges of the plates are riveted to the plates or sheets forming the gasholder sides. The vertical ends of the plates are riveted together by butt or lap joints or by the modified form of coupling plate shown in fig. 6.

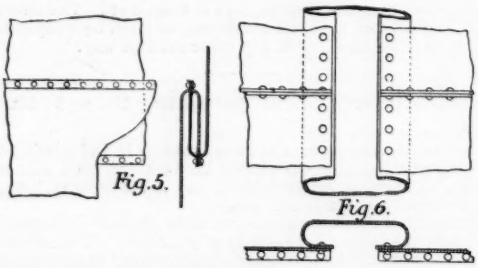


Fig. 5. Fig. 6.

The fourth part of the invention relates to the plates for the gasholder sides or dome, and is illustrated by figs. 7 and 8. In fig. 7, the plates are made with flanges so that they can be riveted together outside the holder; and, by preference, the plates are the same length as the depth of the holder, and can thus be used for the holder sides without horizontal joints. The horizontal edges of the plates may be riveted to angle irons, by which they can be connected to the cups and lutes or other parts of the holder. In fig. 8, the plates are made with flanges,

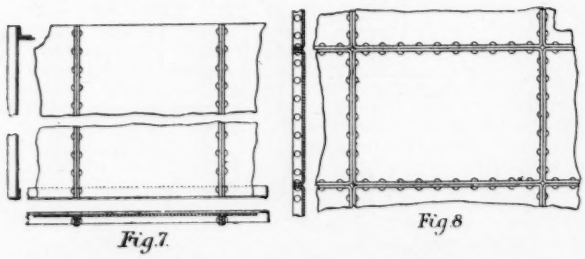
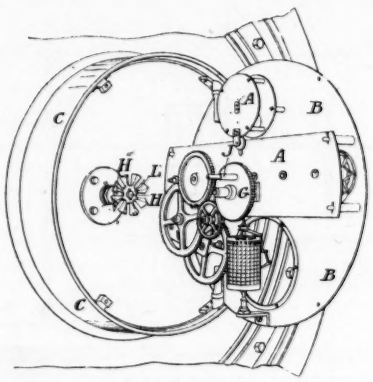


Fig. 7. Fig. 8

which extend all round and are riveted together in horizontal and vertical lines; the space left by the rounded corners of the flanges being filled by a packing-piece or plug riveted over or by a suitable cement. In the third modification (fig. 6), the plates are connected together by a coupling plate similar in section to the alphabetic letter "C," and of such proportions that the plates can be riveted to it on the outside of the holder. In a further modification, the coupling plate is built up of channel irons and plates, of angle irons and plates, or of other parts of suitable sections.

Gas and Water Measuring and Registering Apparatus.—Boult, A. J., a communication from La Compagnie pour la Fabrication des Compteurs et Matériel D'Usines à Gaz, of Paris. No. 8003; April 5, 1902.

The essential feature of this invention consists in placing the whole of the registering mechanism A on the inner side of the closing plate or cover B of the casing C arranged on the front plate of the meter, and constituting the gear-mechanism chamber. The cover is attached to the casing by hinges, or in any other suitable manner, so that, when closed, a toothed disc G or other transmission member of the registering mechanism, automatically gears with the shaft H of the meter, whereas, when the casing is opened (as shown), the whole of the registering gear carried on the cover is completely removed from, and out of gear



with, the shaft of the measuring device. Thus all the parts of the registering mechanism are easily accessible, as well as the meter-shaft and its stuffing-box arranged on a suitable plate, so that the necessary cleaning and repair, as well as oiling, can be conveniently effected without interfering with the exact regulation of the different parts of the mechanism.

The connection of the registering mechanism A with the meter-shaft H can be effected in various ways—for example (as shown), by arranging on the inner surface of one of the toothed wheels G of the registering mechanism a projecting rod J forming a crank-pin which, in the closed position of the cover plate on the casing, engages in a corresponding space between the teeth of a star-wheel L on the end of the shaft of the measuring device.

Gas Governors or Regulators.—Boult, A. J.; a communication from La Compagnie pour la Fabrication des Compteurs et Matériel D'Usines à Gaz, of Paris. No. 8004; April 5, 1902.

The patentees remark that, as in most of the gas-regulating devices already known, the gas is delivered through a valve, the opening of which varies simultaneously with the discharge of the gas according to the movements of a small gas-bell, the weight of which can be varied in order to modify at the same time the gas discharge-pressure—provided that in all positions of the bell, its weight and the discharge or exit pressure acting beneath the bell balance each other. The characteristic feature of the invention consists in the combination with the bell B, p. 835, of the regulator of an apparatus or "feeder" (hereafter described); the devices being so combined that any variation in the drawing off of the gas correspondingly varies the weight of the bell, and consequently effects an increase or decrease of pressure in the supply conduit, which is controlled by the valve A of the regulator.

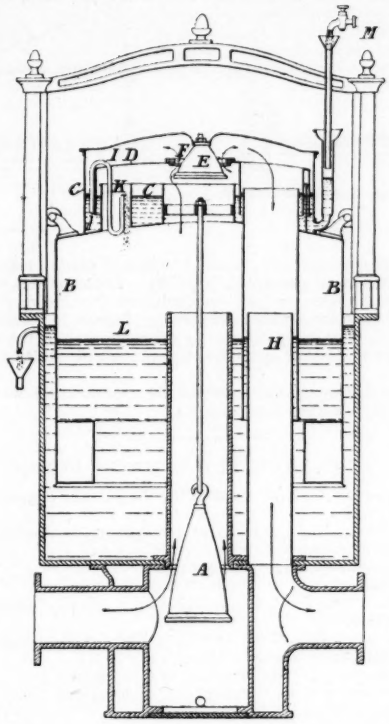
This "feeder" apparatus comprises a water reservoir C closed hermetically by a cover surmounting the bell of the regulator. Within this receptacle is arranged a valve-bell D, the inner surface of which is subjected to the pressure exerted in the central part of the regulator, and, externally, to a pressure which, owing to the reduction in the charge due to the smaller cross-section of the gas-passage F around the valve E, which is suspended from the cover of the reservoir, is slightly lower than the internal pressure. The total amount of gas delivered through the valve of the regulator, after having traversed the passage F formed by the opening in the upper bell and the valve E on the cover or the orifices G formed in the periphery of the valve-bell D (referring to the first modification), passes to the upper part of the latter, and thence through a tube H into the supply-pipe, in which the pressure is controlled by the regulator.

The valve-bell D could also be subjected internally to the inlet pressure of gas of the regulator, and externally to the same pressure less the loss of pressure due to the reduced size of the passage F of the valve. In this case, the gas, after having passed above the valve-bell D, would pass by the valve A of the regulator before arriving at the outlet-tube.

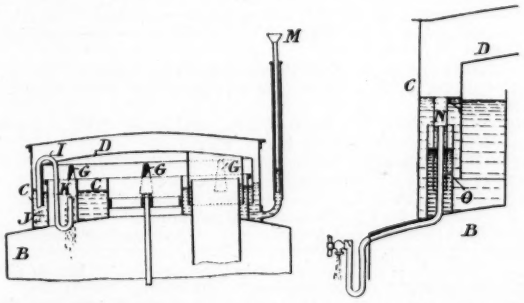
In the cover of the valve-bell is a syphon I, one extremity J of which controls the level of the water in the reservoir C on the main bell, while the other extremity K discharges into the main water-receptacle L the excess of water from the upper reservoir, which is constantly fed through the tap M from some source of water supply.

Whatever, therefore, the discharge may be, the velocity of the gas through the passage F controlled by the valve E on the cover of the upper water-chamber is constant, as the fall of pressure at this point is always constant and is equal to $\frac{P}{S}$; P being the weight of the valve-bell D with all its parts attached to it, and S being its cross-section. From this, it results that any variation in discharge would cause the valve-bell D to take a position so that the section of the open passage for the gas is equal to $\frac{D}{V}$; D being the discharge and V the constant

velocity of flow of gas at F or G out of the upper bell. For another speed of discharge D_I, the section would be equal to $\frac{D_I}{V}$; and for a third speed of discharge, $\frac{D_{II}}{V}$. In other words, if the different positions of the valve-bell D are considered, the corresponding sections or openings are, as regards each other, in equal relation as the different discharges, which would effect the various positions of the valve-bell D.



The variable pressure given by a regulator provided with the feeder, constructed according to the essential characteristic arrangement described above, will be with the discharge in proportion which depends either on the shape of the valve E on the cover according to the arrangement shown complete, or that of the outlet-openings G according to the first modification or on the shape of the "feeder" reservoir C, or at the same time on the shape of the valve E or the orifices G and the shape of the reservoir C, or, finally, on any arrangement actuated by the upper bell and effecting a variation in the charge of water in the reservoir according to the needs of the system supplied with the regulator.



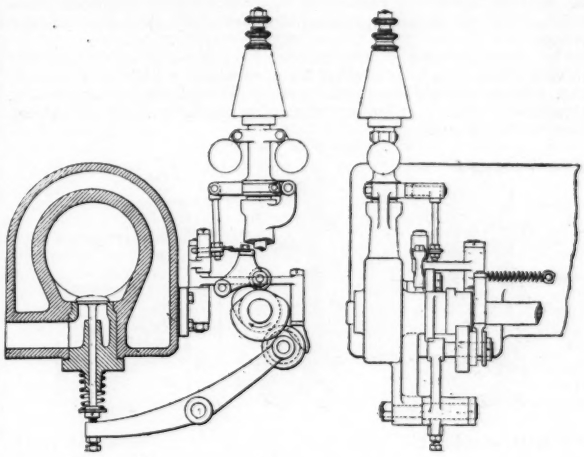
The regulation of the pressure is effected, so to speak, in two ways, as there are two losses of successive charges; the one variable being effected by the supply valve A of the regulator proper, the other invariable, produced by the limited sectional area F or G of the valve or openings.

The outlet-syphon I of the feeder can be replaced either by a flexible tube having its moveable end attached to the valve-bell D or by any other member fulfilling the same purpose—for instance, an overflow tube N with a mercury trap O according to the second modification.

Internal Combustion Engines.—Crossley, W. J., of Openshaw, and Webb, W. le P., of Marple. No. 8704; April 15, 1902.

This invention relates more particularly to methods of governing the speed of internal combustion engines by keeping the exhaust valves, and thereby the charging valves, or other apparatus used for introducing the explosive charges, closed or inoperative when the speed exceeds the normal; so that, after an impulse stroke of the piston, the contents of the cylinder are not allowed to escape, but are compressed and expanded several times if necessary, until the speed is reduced to the normal again, when the exhaust valve is allowed to open and the products of combustion pass out, after which a new charge is taken in through the charging valve or apparatus.

The system of governing employed is by knife edges, or their equivalent, which have only to lift or move light loads, and are not called upon to operate the exhaust valve itself. All that the knife edges are required to do is to move some detail into such a position that it either makes a gap or fills a gap in the train of gear used for operating the exhaust valve. To effect this, a reciprocating part (say a lever) is arranged to be worked by a cam or other mechanical means. This is connected with the governor in such a way that, when moving to and fro, it may hit or miss some essential part of, or part connected with, the gear which operates the exhaust valve. Then, when a "hit" takes place, this part is moved into such a position that it fills a gap in the valve gear, and thus allows the valve to be opened when its gear is operated. When, however, the speed of the engines rises above the normal, a "miss" takes place, and the gap is not filled; the result being that, although the usual motion is given to the exhaust valve gear, or to a portion of it, the valve itself is not moved.

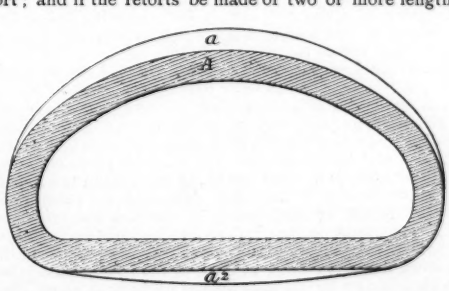


The arrangement shown for obtaining this result may be described as follows: Suppose that an engine is constructed with an exhaust valve which is operated in the usual manner, by a cam, roller, and lever. Suppose also that another cam gives a reciprocating motion to a governor lever which is provided with a blade with a knife edge. A third lever or suitable detail is then arranged and connected to the roller on the exhaust lever, and provided with a die with a knife edge. This die is situated immediately opposite the blade on the reciprocating governor lever, and is raised and lowered according to the speed of the engine, by the action of the governor, in such a way that when the speed falls below the normal, the die is lowered into such a position that it may be "hit" by the governor blade—thus pushing the roller on the exhaust lever along its pin into such a position that the exhaust cam, when it comes round, can meet it, and thus depress the exhaust lever and open the exhaust valve. When the speed and the die rise, however, a "miss" will take place, and the roller will therefore remain in its normal position—aside from the cam, which simply revolves without moving either the exhaust lever or the exhaust valve. The reverse method of operating such a gear would also bring about a similar result—the normal position of the exhaust roller in this case being opposite the cam and ready to open the valve when the governor blade and die "miss;" but when the speed rises, and they "hit," the roller is pushed aside, and thus prevents the valve being opened.

Gas-Retorts.—Trewby, G. C., of Hampstead. No. 9622; April 25, 1902.

This invention (relating to gas-retorts of clay or brick, and of either Ω or oval shape) has for its object "to so construct the retorts that they can be made of much greater width and capacity than is at present the case."

A transverse section of one form of such retort is given. The arched top A of the retort is provided with external ribs or projections *a*, arranged transversely at intervals preferably throughout the length of the retort; and if the retorts be made of two or more lengths, at the



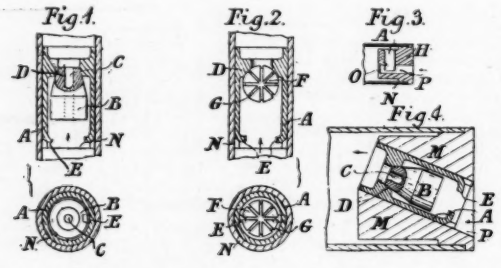
ends of the lengths—where they abut against each other. The ribs or projections are preferably made to join the body of the retort in a gentle curve (as shown) and to gradually lessen in height from midway of the arch till they merge into the general thickness of the retort at, or towards, the sides. The ribs or projections can, says the patentee, be arranged at right angles to the length of the retort, or diagonally if desired; and whether arranged at right angles or diagonally, they can be connected by ribs or projections, extending lengthways, and parallel,

or at an angle, to the length of the retort. The exterior of the bottom of the retort may be provided, if desired, with similar ribs or projections as shown at a^2.

Regulators for Gas-Burners.—Baertl, F., of Zurich, Switzerland. No. 11,993; May 26, 1902.

This invention relates to an automatic gas pressure regulator adapted to be inserted into the burner, or into the gas-pipe in proximity to the burner, in such a manner as not to lengthen the pipe or alter the height of the flame. It comprises a valve situated in a sleeve below the valve-seat carried by the sleeve; the valve having a passage or orifice (or plurality of passages or orifices) adequate for a sufficient quantity of gas at high pressure, and adapted to be pressed against its seat by such high pressure, whereas, on reduction of pressure, it moves from its seat by gravity, so that the increase of passage area required for the reduced pressure is supplied by the valve passage proper.

Fig. 1 is a vertical and cross section of one form, in which a conical valve is used. Fig. 2 is another form, in which a ball-valve is used. Fig. 3 shows the regulator applied to the horizontal pipe of a gas-cooking apparatus. Fig. 4 is for use when the regulator is in an inclined position in the pipe.



A is the sleeve of the valve, N the gas-pipe, D the valve seat, and E an arrangement for limiting the downward movement of the valve, consisting of inwardly turned edges of the lower end of the sleeve. In fig. 1, B represents the conical valve, provided with a cylindrical or conical passage C, the cross section of which must be such that when the valve is closed by high gas pressure the quantity of gas required to supply the burners can pass through the passage.

In order that when the gas pressure becomes less the valve body will move away from its seat D owing to gravity, its arrangement is vertical or more or less inclined with regard to the valve-seat. As already stated, there must be sufficient space between the circumference of the valve body B and the inner wall of the sleeve for the required quantity of gas to pass to the burner.

In the form of construction shown in fig. 2, with the ball valve F, the circumference of the latter is so grooved or channelled at G that, when the valve is closed, the grooves allow the necessary quantity of gas to pass through.

In gas cooking apparatus, the pressure regulator is inserted in the (usually) horizontal gas-pipe arranged in front or at the side of the apparatus. In order to give the valve body B of the regulator the requisite vertical or inclined position, sockets H I K L M (figs. 3 and 4) are provided. Fig. 3 shows a socket H of this kind, into which the regulator is vertically inserted in the sleeve, as before described. P is the bore of the socket through which the gas enters. The other end of the socket is closed, and the gas is compelled to traverse the sleeve so that it passes out through the space between the inner wall of the pipe N and the outer wall of the socket H. Through a small aperture O in the socket H, a small quantity of gas can also pass to the point of consumption. By this means, the passage of the valve body B (fig. 1) can be made narrower; and by increasing the size of the orifice O, the gas passage can be easily increased, and thus regulated with open and closed valve.

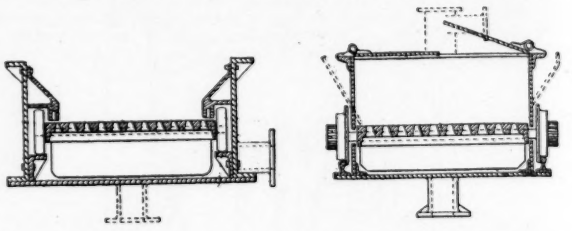
Fig. 4 shows a form in which the regulator is arranged in an inclined position in its socket M.

Hot-Coke Conveyors.—Graham, Maurice, of Leeds. No. 1560; Jan. 22, 1903.

This invention of apparatus, mainly for conveying hot coke direct from the retorts in gas-works, is a further improvement on patents No. 24,659 of 1899 and of No. 11,979 of 1900.

In coke-conveyors of this type, it has hitherto been customary for the drag or push-plate chain to work upon the bottom of the trough; moreover, in the event of a steel plate or steel belt conveyor being adopted, this also has been worked on the bottom of the trough. In both cases, the coke has fallen direct from the retorts into the conveyor. In the first case (with the drag or push-plate conveyor), the coke has either been pulled red hot along the trough towards the end of the conveyor, where it has been quenched by passing through water in the trough at that point, or else the hot coke has been quenched directly after having fallen into the trough in the first instance. Both these systems of quenching have the drawback that any excess of water is carried along in front of the coke, and consequently is eventually taken up by the coke during its passage along the trough —the coke being delivered in a completely saturated condition. In the second case (with the steel plate or belt conveyor), there has always been water between the bottom of the trough and the steel-plate conveyor, so as to keep the latter from getting too hot, and thus getting out of shape. This also has resulted in the coke becoming too wet, and being delivered in a saturated condition.

The object of the present invention is to overcome any such objection, and to provide an arrangement whereby the coke, after being quenched at the point of its entry into the conveyor-trough, can be drained of its superfluous water during its conveyance along the entire length of the apparatus, so as to be delivered in a more or less dry and marketable condition, by employing within the trough an endless travelling conveyor constructed in the form of a perforated grid, and by raising this travelling grid to a suitable height above the level of the bottom of the trough. After the quenching operation, therefore, the waste water drains through the perforated grid into the lower portion of the trough, which serves as a conduit for the waste water and small breeze or refuse. Suitable outlets are provided, either in the



side or bottom of the trough, for the purpose of getting rid of the waste water and refuse as quickly as possible. These outlets, or any convenient series of them, can be connected directly or indirectly to a sump or collecting tank, from which the smudge, breeze, or refuse can be extracted by a slow-running elevator or other apparatus; the water being run off and pumped over again for the purpose of quenching the coke as described.

Transverse sections of two forms of the apparatus are shown. They do not need any detailed description.

APPLICATIONS FOR LETTERS PATENT.

5429.—Hearson, C. E., "Controlling the passage of gas to burners." March 9.
5480.—Boult., A. J., "Electric gas-lighters." A communication from the Electric Contact Company. March 9.
5541.—Rosenberg, A., "Gas-igniters." March 10.
5544.—M'Conechy, J., "Production of acetylene gas." March 10.
5589.—Branston, F. R. E., and Burnell, H. B., "Manufacture of coal gas." March 10.
5674.—Benson, W. A. S., and Co., Ltd., and Andrews, F. A., "Incandescent gas-burners." March 11.
5676.—Bowing, J., "Manufacture of combustible gas." March 11.
5703.—M'Conechy, J., "Production of acetylene gas." March 12.
5781.—Jones, W. R., "Manufacture of gas." March 12.
5793.—Pike, E. S., "Incandescent gas-burners." March 12.
5798.—Thompson, W. P., "Gas-producers." A communication from Schweizerische Lokomotiv-und Maschinenfabrik. March 12.
5800.—Lorenz, L., "Incandescent gas-lamps." March 12.
5805.—Lion, G. P. J., "Carburetting by means of naphthalene." March 12.
5818.—Parkes, S. T. H., "Chimneys for gas and other lamps." March 13.
5838.—Miller, W. L., "Gas-brackets." March 13.
5866.—Siemens, F., "Regenerative gas-furnaces." March 13.
5910.—Dempster, R., and Sons, Ltd., and Broadhead, J. W., "Gas-Purifiers." March 14.
5955.—Denayrouze, L., "Incandescent gas-burners." March 14.
5956.—Gamwell, H. & C., "Coin operated gas-meters." March 14.
5959.—Kugel, P., and Gelpke, V., "Steam or gas turbines." March 14.
5977.—Ahrendt, H., "Inverted incandescent gas-burners." March 14.
5991.—Smith, F. B., "Acetylene gas plant for street lighting." March 16.
6004.—Beardmore, W., and Co., Ltd., and Atha, C. G., "Reversing valves for regenerative furnaces." March 16.
6009.—Whitehead, J., "Prepayment meters." March 16.
6017.—Thorp, T., "Water-meters." March 16.
6041.—Corinaldesi, L., "Steam or gas turbines." March 16.
6048.—Cotton, F. T., "Incandescent gas-lamps." March 16.
6056.—Meunier, S., and Anderson, J., "Automatically controlling gas-jets." March 16.
6059.—New, A. G., "Internal combustion engines." March 16.
6071.—Enright, J., "Gas-engines." March 16.
6090.—Burschell, E., "Removing sulphuretted hydrogen from gases, with simultaneous recovery of sulphur." March 16.
6136.—Keith, J. & G., "Incandescent gas-burners." March 17.
6138.—Guese, W. E., and Fox, G. A., "Convertible gas-mixer." March 17.
6142.—Baughan, W. H., "Generating acetylene gas." March 17.
6168.—Cooley, J. F., "Rotary fluid engines." March 17.
6182.—Pascal, F., "Liquid meters." March 17.
6200.—Crawford, B., "Gas and other engines." March 17.
6208.—Baxter, H. N., "Illumination by gas." March 17.
6258.—Robertson, R., and Watson, Gow, and Co., Ltd., "Gas-cookers." March 18.
6261.—Wise, W. L., "Gas-generators." A communication from H. W. Webb. March 18.
6282.—Abel, C. D., "Automatically extinguishing lights after a given time." A communication from La Compagnie Anonyme Continentale pour la Fabrication des Compteurs de Gaz et Autres Appareils. March 18.
6305.—Scott, R. M., "Burner for lighting or heating." March 18.
6306.—Melhuish, A. G., "Internal combustion engines." March 18.
6311.—Glasgow, A. G., "Water-gas generating apparatus." March 18.
6348.—Cowan, W., "Prepayment gas-meters." March 19.
6407-8.—Thornycroft, Sir J. I., "Internal combustion engines." March 19.
6420.—Boella, M., "Steam or gas turbines." March 19.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Suggested New Gas-Stove.

SIR,—Mr. Cleverly may, I think, with advantage bear in mind the remark of Mr. Tysoe, the President of the Southern District Association of Gas Engineers and Managers, as reported in the last number of the "JOURNAL," that "gas making is a business the essential feature of which is that it must pay to run it." It never has paid to introduce combined appliances such as Mr. Cleverly desires; it has been tried too often already. As regards the warming of air "before being burnt," to increase the "calorific value," as suggested by him in his last letter (*ante*, p. 704), a little knowledge would have shown him that, for use under ordinary conditions, the most important point is to keep the burner, air, and gas as cool as possible up to the point of actual combustion. He will also, no doubt, be surprised to learn that, owing to a very simple and well-known physical law, an increase in the temperature of either air or gas, or both, before being burnt, gives a flame lower in temperature than if colder gas and air are burnt, other things being equal.

If a demand arises for possible new departures, there need be little fear as their being fully met; but the ground which interests Mr. Cleverly at present is too old and worn to be worthy of much consideration from those who have both long and costly experience to guide them. It is rather curious that in a list of patents published this week is one for keeping cool the air and gas of an incandescent lighting burner up to the point of combustion; and it is evident that the patentee fully understands his subject. Hot gas or air, except under special conditions, means trouble in several ways, as many makers of various appliances know only too well.

Warrington, March 24, 1903. THOS. FLETCHER.

SIR,—Your correspondent Mr. Cleverly, in his letter in the "JOURNAL" for the 17th inst., expresses surprise that, so far as he is aware, there has been no gas-stove made, either for heating or cooking, "in which the gas or air is warmed before being burnt, so as to secure greater calorific value for the gas." We may inform your correspondent that all our large hotel gas-cookers are constructed on the regenerative principle; the whole of the air being drawn from the top of the stove, and heated before combustion. The result is considerable economy in the use of gas. We have also applied the same principle to our bakers' and tailors' ovens with excellent results.

Glasgow, March 24, 1903. R. & A. MAIN, LIMITED.
(A. P. Main, Managing-Director.)

[This subject has now been sufficiently discussed.—ED., J.G.L.]

Use of Fans for Increasing Pressure.

SIR,—In the interesting address to the Southern District Association on the 19th inst., Mr. Tysoe said he believed the idea of using fans for maintaining pressure in the mains originated some four years ago. In 1894, I put down at the Waterford Gas-Works a fan, driven by a gas-engine, to exhaust gas from the town mains to fill a holder on the far side of the River Suir, which supplies the district on the north side of the river when the supply of gas is interrupted by the opening of the drawbridge. It has worked satisfactorily for the past nine years. I selected a fan in preference to an exhauster for this purpose so as to have a steady, instead of a pulsating, draught upon the town mains; also to avoid some expense in connections. There is only one pipe to act as both the inlet and the outlet of the holder. When supplying from the holder, the gas simply passes back through the fan, which is practically no obstruction.

35A, *Great George Street, S.W.*, R. BRUCE ANDERSON.
March 23, 1903.

Increase of Capital at York.—Two years ago, the shareholders of the York Gas Company authorized the raising of £30,000 of new share capital. As, however, since then the whole of the capital of the Company has been converted into a uniform 4 per cent. stock, it became necessary to rescind this resolution, and substitute one authorizing the issue of new stock. This was done at a special meeting last Thursday, when it was decided to raise £40,000 by means of 4 per cent. preference stock. The quantity of gas sold by the Company has increased during the past ten years by about 39 per cent.

Municipal Gas and Water Supply in the Rhondda Valley.—An interesting sequel to the purchase of the undertaking of the Ystrad Gas and Water Company by the Rhondda Urban District Council is presented by the audited accounts of the Council for the year ended March 31, 1902, which have been issued. They showed the total expenditure to have been £64,949, towards which a rate of 3s. in the pound for the year brought in £60,359; the balance being made up of miscellaneous receipts and contributions by the Glamorgan County Council and other local authorities. The credit balance brought forward from the previous year was £26,432; and £27,048 is carried to the next account. The chief reproductive undertakings are the gas and water-works, both of which drew pretty heavily from the rates. On the gas-works, there was a deficit of £2102, and on the water-works one of £2159. The revenue account in respect of the former shows a profit of £7503; while the water-works account had a credit balance of £2654. These amounts, however, were not sufficient to meet the loan charges.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

THERE has been quite a break in the Committee work on Gas Bills through the extensive mutual concession that has been going on between promoters and opponents. Up to the present, only two of the Bills sent to Committees have been fought out to a conclusion—the Plymouth and the Hexham—and these are not likely to trouble a Committee of the second House. The others have all been settled without calling for a pronouncement by the Committees to whom they were referred—excepting the Walker and Wallsend, and the land clauses of that are the only ones now opposed. In the case of all the others, compromise has sent them forward; and quite a number that have not been referred to a Select Committee have quietly worked their way into an unopposed state. In fact, running cursorily over the list of applications for Bills dealing in any way with gas matters, more than half, it can now be confidently said, will pass forward without further impediment. The remainder do not number more than a dozen-and-a-half; and these include the group of London Gas Bills, which, it is expected, will be taken up by a Commons Committee after Easter. Four other Gas Bills are in a group which have been entrusted to a Lords Committee to meet on April 30; and—in the case of one or two of them at least—it is anticipated that the petitioners will be satisfied before that date arrives. But over one of the Bills—the Birmingham Corporation—there is the promise of a strenuous tussle in connection with the proposed new scheme of gas-works. In addition to this small group and the London measures, there are only about eight Bills as to the probable course of which nothing is yet known. Among them is the Derby Bill; and this looks like producing the parliamentary contest of the session in connection with provincial gas companies. However, if there is not an ebb of the difference-adjustment wave with which the session has opened, some of the other half-a-dozen or so may also soon drop into the peaceful condition of the many that are already passing safely on their way. It would be interesting to learn the real secret of this reaction (which began to set in last year) in favour of agreement between opposing parties and promoters. Is it that local authorities are awakening to the fact that it is not often the heavy expense involved in fighting meets an adequate requital in gains?

With regard to last week's work, the Lords Committee who commenced their sittings at the end of the previous week were the sole representatives of the Upper House in the Commitee rooms; and they completed the task allotted to them yesterday. So far, there is only one other fixture in which we are concerned for a Lords Committee; and that is the one already mentioned for April 30. Five Commons Committees were in evidence during the week; but three of them were busy on railway and tramway schemes. The remaining two were the only ones in which gas or water interests appeared; and their proceedings do not directly afford much to report upon. Of the Gas Bills referred to one of them, Bridgwater and Market Drayton dropped out through their settlement even before the Committee sat. Ipswich (as announced last week) followed suit; and then the North Middlesex Gas Company, soon after the hearing of their case commenced, came to terms with their opponents. The Newcastle-upon-Tyne Electric Supply Company's Bill (in which the Walker and Wallsend Union Gas Company have an interest) was discussed, for a brief time on Wednesday, and again throughout Friday; and this measure was responsible for delay of the consideration of the only opposed part of the last-named Company's Bill. In the same group is the Sutton Water Bill. The other Committee had in their list the Hampton Court Gas Company's Bill; and, as will be seen hereafter, the opposition was also pacified in that case. The Bath Water Bill appeared in the same list; and in that instance, a settlement was effected after a brief hearing. The Water Bills are comparatively light this session; and, so far, only their fringe has been touched. A number of gas measures have been, or are entered to go, before the Committee on Unopposed Bills; and among them is that of the Broadstairs Gas Company, which shows that the Local Authority and the residents are satisfied this time with the site the Company are proposing for their new works.

Big Preparations and a Quick Settlement. It is one of the strong stock arguments in the Committee rooms that the granting of large—large in proportion to the existing capital—money powers has the effect of keeping the proceedings of companies from the review of and revision by Parliament for too long a period. This complaint could not be made in respect of the North Middlesex Gas Company, who, in Parliament this year, were there before eight years since. Their Bill was the first of the gas measures to come before one of the Commons Committees who commenced their sittings on Tuesday. It looked at the opening as though there was going to be a stiff struggle over the measure; there being two District Councils—the Hendon and the Finchley—in opposition, with between them two King's Counsel and two juniors; while the promoters themselves were represented by four Counsel, of whom three are luminaries of the parliamentary bar—Sir Ralph Littler, K.C., Mr. Baggallay, K.C., and Mr. Honoratus Lloyd. The anticipation of a good fight was sustained during the opening of Sir Ralph and the examination of the first witness, Mr. A. M. Paddon, who is one of the Directors of the Company, and the son of an old gas engineer and now gas company administrator. Then came the mid-day adjournment, and with it an abrupt cessation of hostilities; for outside the room the parties arrived at an agreement, the simplicity of which makes the outsider wonder why it could not have been reached before the parties assembled in opposition at Westminster. Under the circumstances, only those points which were the subject of concession need be noticed. The promoters asked for new capital powers to the extent of £120,000, with a limit of 7 per per cent., or, if issued as preference stock, 6 per cent. One of the petitioners considered that 5 per cent. would be an ample return for such part of the money as was issued with preferential rights;

and one of the points of the agreement was that it should be limited to the smaller figure, and that debenture stock should be raised at 4 per cent. Incidentally it may be mentioned, as it is a point of some interest, that it is proposed by the Bill to continue the existing sliding scale arrangement, with a standard price of 4s. 3d.; but the sliding-scale is to come into operation on half-yearly instead of yearly variations in price. A feature of this session's Bills is the establishment of renewal funds; and the proposal in this case was that ½ per cent. should be set aside on the paid-up capital until the fund equalled one-fifth of it. In the settlement, the promoters withdrew to one-tenth. Then the Hendon Council complained of the quality of the gas, which complaint the promoters held had no good foundation; but the Company made a liberal concession when they consented, in the settlement, to the establishment of a testing-station at Hendon, at the expense of the opponents, who are to have the right to test the gas there at any time without notice to the Company, but there is to be no forfeiture if it is proved that a defect is due to unavoidable causes. However, it shows the Company are not fearful of bitter consequences; and perhaps the Hendon Council will find that the station is nothing more than (for the good it will do) an expensive fad. Of course, in the petitions there were several other objections raised to the provisions of the Bill; but they were not in any way involved in the settlement, and so do not claim attention here. The Bill will now proceed without further opposition.

Ipswich Gas Bill. The settlement in the case of this Bill was effected in time on Monday last week for an announcement to be made on the subject in these notes the following day. As to the nature of the changes in the Bill, Mr. J. T. Jolliffe, the Engineer and Secretary of the Company, has kindly informed us. The Company desired authority to raise further capital not exceeding in the whole £150,000 in additional ordinary "C" stock or new preference stock. The Corporation secured a reduction of the total amount to £120,000; and to meet the views of Lord Morley, a provision has been inserted to the effect that, of the sum named, the Company are not to raise a larger amount than £75,000 by the creation and issue of preference stock. Then, in connection with the proposed new powers to purchase land, the Company have agreed with the Corporation to the following addendum to the clause: "Provided that the Company shall not store gas upon any lands acquired under the powers of this section in the Borough of Ipswich, unless they shall, in addition to the consents required by the Gas-Works Clauses Act, 1871, obtain the consent of the Corporation." A clause allowing discounts or rebates, if the Company think fit, to consumers, "provided that such discounts or rebates shall be of equal amount under like circumstances to all consumers," has been amended, by Lord Morley's desire, as follows: "The Company may, if they think fit, allow discounts or rebates not exceeding in any case 20 per cent. to consumers of gas in consideration of prompt payment of gas-rents, or of large consumption, upon such scale, and subject to such conditions and regulations, as may be prescribed by the Company: Provided that such discounts or rebates shall be of equal amount under like circumstances to all customers: Provided also that, in the event of the Company allowing discounts or rebates in consideration of prompt payment of gas-rents, notice thereof shall be endorsed on every demand note for gas-rents." By his Lordship's request, the provisions of the Gas-Works Clauses Act, 1847, with respect to the breaking up of streets for the purpose of laying pipes and apparatus and for the protection of pipes when laid are, so far as they are applicable to extend and apply to pipes and apparatus laid in streets not dedicated to public use. Then an agreement has been made with the Corporation for the repeal of sub-section 5 of section 29 of the Company's Act of 1883, and for the following provision to have effect in lieu thereof: "In order to enable the Company to be represented at any testing for purity and illuminating power, the Corporation shall give to the Company, at their principal office, reasonable notice in writing of their intention to make such testings."

Perseverance Rewarded at Hampton Court. When a Company is applying to Parliament for additional powers, a plurality of local governing bodies in the district is not a thing over which they can rejoice. Every one of the authorities may be advised by different Parliamentary Agents and experts; and the number of objections are multiplied accordingly. Every local authority beyond the central one makes the chances of opposition the greater, and the chances of settlement the more remote. And trouble, anxiety, work, and expense to the promoters must also be multiplied (within a little) by the number of the authorities to be dealt with. The Hampton Court Gas Company, in introducing this session what is, to all intents and purposes, practically a Money Bill, had to encounter no less than four District Councils and a Tramway Company, whose combined objections and requirements made quite an imposing array. But the Chairman and Directors, the Engineer (Mr. W. E. Price), and the Secretary (Mr. W. C. Lamb) all worked together with hearty goodwill to conciliate and meet, so far as the interests of the Company would allow them, the whole of the parties. They succeeded, but not finally with the last of those who had petitioned against the Bill until the very morning—Thursday last—that the Bill was entered for the consideration of Mr. Tennant's Committee. There were many points raised in the petitions which were not touched in the settlement; but it will be sufficient to scan those which appeased the opposition. The Tramway Company preferred a peculiar request. They desired a general clause giving protection to their property on the same lines that gas companies enjoy for their pipes under section 30 of the Tramways Act of 1870. The Gas Company naturally resisted this; but, having a clause in the Bill to empower them to lay pipes for ancillary purposes, they agreed with the Tramway Company for a modification of their general request to such pipes. To have consented to give the latter protection in respect of the whole of the gas distribution system would have been nothing short of absurd. The main questions for settlement with the various Councils were the initial price and the extent of the new capital powers. In the Bill, the promoters asked for a standard price of 3s. 9d. per 1000 cubic feet; their present charge for gas to the consumers being 3s. 4d. With one Council a settlement of the standard price was effected at 3s. 8d.; but in the case of the others the Company to avoid a contest, offered to come down to 3s. 6d. This, however, was not altogether satisfactory; so ultimately the Company agreed to adopt—not a neutral zone, but the Chard terms. In other words, they are not to divide any increased dividends until the charge for gas is below the present selling price of 3s. 4d.; but, as soon as it is reduced to less than that figure, then they can divide up to the full 3s. 6d. The Company also sought for power to consolidate their stock, with an addition of £100,000, and one-third borrowing powers. They have agreed to reduce this to £90,000, with one-third loan. In the Bill, there was no sulphur limitation; but the first Council the promoters met asked for the insertion of a clause restricting the amount of sulphur to 20 grains. The representatives of the Company gave the Council a little instructive information on the subject of purification—pointing out that, if they insisted on 20 grains, lime would have to be used in the purification, which might cause a nuisance in the neighbourhood. Therefore—the Company not objecting to the imposition of a limitation—it would be to the interest of the Council to fix their demand at such an amount as would permit of the use of oxide only. The Council were convinced, and modified their request to 30 grains. These were the chief points of the agreement, and the only ones calling for notice. Discretion and diplomacy here succeeded in pacifying a formidable-looking opposition.

Severance of Gas and Electricity. There will be some little regret felt in the gas industry that the only Gas Company in the country—the Walker and Wallsend Union—who have taken up the public supply of electricity should now be parting with their powers in this regard. They, of course, know their own business best, and must study their own interests first. Other Gas Companies, however, who may be contemplating taking on to their shoulders the responsibilities of electricity supply will, before making the venture, be curious to know exactly what has induced the Walker Company to take this step. It is to the Newcastle Electric Supply Company, Limited, that the electric undertaking and powers of the Walker Gas Company are being transferred; and, *inter alia*, it is for sanction to this transfer that the former Company have a Bill in Parliament this year. The measure was under the consideration of a Commons Committee last week; but the part of the Bill dealing with the transfer was only incidentally mentioned, as there was no opposition thereto. However, for their undertaking and powers, the Walker Company are, it seems, to obtain advantageous terms. The consideration for transfer is in stock of the Electric Supply Company—one £5 ordinary and one £5 preference share for every £10 of stock invested in the Gas Company's electricity undertaking. According to market valuations, £100 of the Gas Company's electricity stock, if sold as shares in the Newcastle Electric Supply Company, is worth (roughly) £160. The Bill discloses the fact that the electricity capital of the Walker Gas Company is in 7009 shares of £10 fully paid.

Walker and Wallsend Gas Bill. By this Bill, the last-mentioned Company are seeking, among other things, to convert their present capital, and to raise £200,000 of additional share and loan capital, to reduce the illuminating power of the gas from 15½ to 14 candles, to alter the mode of testing in accordance with the suggestion made in the Bill of the Commercial Gas Company now before Parliament, and to form a renewal fund. The Company supply Walker, Wallsend, Wilmington, and Howden; and, on behalf of all these parishes, an opposition was entered and petitions lodged, and at one time it seemed as if the Bill would be of a highly contentious character. The Corporation of Walker, Wallsend, and Wilmington sought the assistance of Mr. W. A. Valon (Messrs. W. A. Valon and Son) to advise them with regard to the action they should take. A report and visit to the district by Mr. Valon resulted in a conference between the Directors and the Local Authorities on the spot, but did not end in a general agreement as to the matters in the Bill recommended by Mr. Valon for amendment. A further conference was held on Wednesday last at the office of the promoters. It was attended by Mr. Goring Pritchard (Messrs. Sharpe and Co.) and Mr. Valon as advisers of the Corporation, and Sir George Livesey and Mr. Charles Hunt as the advisers of the Company. Although many matters were agreed to, one or two outstanding questions prevented the final withdrawal of opposition. The matter, in fact, went so far as the preparation of proofs and instruction of Counsel. On Friday morning, however, arrangements were accepted on both sides as satisfactory; and the opposition by the Local Authorities was withdrawn. With regard to the reduction of the illuminating power of the gas by 1½ candles, it is understood that 1d. reduction in price has been agreed upon. There is, however, in connection with the Bill a strong opposition by the Newcastle and Gateshead Corporation (from whom the present site of the Walker works is held on lease) in regard to the enfranchisement of the works and lands to be purchased by the Company for the enlargement and extension of the works. This matter remained for settlement by the Committee after the Newcastle Electric Supply Bill was disposed of; and on Friday the Company's witnesses—among them Sir George Livesey, Mr. Charles Hunt, and the Engineer (Mr. A. B. Walker)—were all in attendance ready for the contest. But, unfortunately, the proceedings on the Newcastle Bill were prolonged to an unexpected length by the raising of points unconnected with the transfer of the Walker Company's electrical powers; and it was not until yesterday morning that the leading Counsel for the Gas Bill was able to lay the Company's case before the Committee.

Millowners' Protection at Bath. When the Bill promoted by the Bath Corporation for powers to construct additional works came before Mr. Tennant's Committee on Wednesday, it was found there was only a group of millowners opposing. The need for a further supply of water for Bath was abundantly proved by the numerous figures given in Mr. Balfour Browne's opening speech. The special object of the new proposals is to get a further supply for the low-level district of the city, in order to relieve the 50,197,137 gallon reservoir at Monkswood, and so secure therefrom an improved supply for the middle level district. The scheme contemplates that the new works shall be fed from springs in St. Catherine Valley; but the fear of the millowners on the Avon was that this would result in

water being diverted from their mills. The Corporation, however, are only proposing to take 200,000 gallons per day more than they are at present entitled to. Statements by Mr. Balfour Browne, in his introductory address, opened the eyes of the legal representatives of the opponents; and they thought they saw their way to an agreement. The Committee permitted a short adjournment for consultation, with the result that opposition was withdrawn on these terms: A total of not more than 200 million gallons of water per annum to be taken; an amount not exceeding 60 million gallons to be taken from June to September; not more than 500,000 gallons to be taken in any twenty-four hours during that period; the balance of the 200 million gallons to be taken in the remaining months of the year. Provision was also made for the measurement of the water taken, and for penalties (to go to the millowners) in the event of the powers being at any time exceeded. The preamble of the Bill was declared proved; and, on the basis named, the clauses were settled.

Wolverhampton's Pumping Operations. A Bill which the Staffordshire and Worcestershire Canal Company introduced to the Earl of Dartrey's Committee last Friday was really as much a water measure as a canal one. With the provisions in respect of the canal we have nothing to do; but an interesting point occurs in connection with the water provisions, which have reference to the pumping operations of the Wolverhampton Corporation. The Company who supplied the town with water before the Corporation took over the duty, had power to pump water from springs at Tettenhall; but the Canal Company and neighbouring millowners were protected by a clause which prohibited the C mpany pumping, within a radius of 1000 yards, to a lower depth than 18 feet of the top water-level of the canal. In 1850, the restriction against pumping below 18 feet was removed; and the Canal Company now sought power to assent to this being done by the Corporation, subject to proper precautions being taken against the canal itself being injuriously affected, and the making good by the Corporation of any damage occasioned. The latter had also agreed to pay the Company £5000 to enable them to procure water for the canal from another source, to make good any loss arising from water being pumped into the Tettenhall reservoir from a lower depth than the 18 feet. The Seisdon District Council opposed, holding that, inasmuch as the Corporation were to be allowed to go to a greater depth, they would pass into different strata, and affect the water in the wells and springs at a greater distance—among them, it was feared, Tettenhall well, from which Seisdon obtains its supply. In these circumstances, they asked for a clause extending the 1000 yards radius of protection, or that the Corporation should supply them with water if, by reason of their pumping to a lower depth than 18 feet, the water in the Seisdon wells was reduced. From the argument of the matter, their Lordships came to the unanimous conclusion that some further protective clauses should be inserted in the Bill, and they extended the limits of protection to 2 miles, excluding polluted wells, and imposed on the Canal Company the duty of buying the pipes for the supply of water to houses already built within these limits. The adjustment of clauses in conformity with these terms stood over until yesterday.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills reported, with amendments: Faversham Gas Bill, Hexham Gas Bill, Nantwich Urban District Council Bill, Plymouth and Stonehouse Gas Bill.

Bill read the third time and passed: Nantwich Urban District Council Bill.

The Draycott Gas Company have presented a petition against the Derby Gas Bill.

The Birmingham Corporation Bill, Harrow and Stanmore Gas Bill, Rickmansworth Gas Bill, and Wellington (Salop) Gas Bill have been referred to a Select Committee, consisting of Lord Newton (Chairman), the Earl of Romney, Lord Sandhurst, Lord Shute, and Lord Wandsworth; to meet on Thursday, April 30.

HOUSE OF COMMONS.

Monday, March 23.

MUNICIPAL SUPPLY OF ELECTRIC LIGHT FITTINGS.

In the General Powers Bill promoted by the London County Council, provision is made, in clauses 63 and 64, for the Council of any Metropolitan borough having control of an electric light undertaking to supply fittings to consumers, and to borrow money for the purpose. The Bill having been read a second time,

Sir F. Banbury to day, in accordance with notice, moved that it be an instruction to the Committee to whom the Bill would be referred to omit the above-named clauses. He contended that to retain them would be to allow the Councils referred to to embark upon what was practically retail trading; and if this were authorized, he did not know where it would be possible to draw the line. We might eventually arrive at a state of things in which the country would be run by the municipalities.

Sir W. Tomlinson seconded the motion, pointing out the unfair competition to which private traders would be subjected by reason of Borough Councils carrying on the business of electric light fitting with the unlimited capital represented by the rates.

Mr. Burns explained that the two clauses in question were not initiated by the London County Council, although they found a place in their Bill. The Borough Councils of London who were empowered to supply electric light desired also to supply fittings, just as a company did; and, to save expense and time, they agreed with the County Council for the insertion of the necessary clauses in the Council's General Powers Bill, instead of bringing in 27 separate Bills. Of the entire number of Councils, 18 were in favour of the clauses, and only two opposed to them. Many provincial town councils enjoyed these and even wider powers. Wherever they had in London a company supplying electric current, the price was higher than where this was done under municipal enterprise.

Sir F. Banbury said his argument did not bear upon electric light, but upon the setting up of retail shops to supply fittings.

Mr. Burns contended that, if a municipality could supply the major requirement 50 per cent. cheaper, they could do the same with the minor. At present electric lighting was the luxury of the rich, because the poor could not pay down a lump sum for fittings and installation; but the Borough Councils could easily meet the case with advantage to would-be consumers and no disadvantage to ratepayers as such.

Sir J. B. Maple said if the clauses remained in the Bill, they would find a staff of many thousands of men employed by the Borough Councils at high wages, and an enormous amount of capital would be invested in wires and fittings. He hoped that the instruction would be carried.

Mr. Soares, guided by the experience of the Barnstaple Town Council in the supply of electricity, supported the proposals contained in the Bill.

Mr. Whitmore objected to the clauses, because he thought they would sanction an undue, unfair, and uneconomical interference on the part of municipal bodies with the freedom and proper exercise of their rights by private traders.

Mr. Lough pointed out that the clauses were permissive in their character; and he insisted that the powers sought were the necessary complement of those which the House had already conferred on the Borough Councils.

After some further remarks, the House divided, and the numbers were: For the instruction, 126; against it, 109—majority, 17.

The following further progress has been made with Bills:—

Bills reported, with amendments: Bath Corporation Water Bill, Bridgwater Gas Bill, East Ardsley Gas Bill, North Middlesex Gas Bill, Winchester Water and Gas Bill.

Bills withdrawn: Billingshurst and District Gas Bill, Kent Water Board Bill.

COURT OF REFEREES.—Thursday, March 26.

LONDON COUNTY COUNCIL (GENERAL POWERS) BILL.

This Bill came before the Court to-day—Mr. Parker Smith presiding—on an objection taken by the promoters to a petition in opposition, which the Commercial Gas Company sought to present.

Mr. Balfour Browne, K.C., for the Commercial Gas Company, said his clients objected to clause 54 of the Bill, which provided that, from and after the passing of the Bill, section 6 (description of burner for testing illuminating power) of the South Metropolitan Gas Act of 1900 should be repealed. At first sight, it appeared curious that the Commercial Company should petition against the repeal of a section of the South Metropolitan Company's Act. The position was this: There was a group of Bills, which included the London County Council (General Powers) Bill, which stood first, and the Commercial Gas Bill. The proposed repeal of the section would be argued upon the London County Council Bill. The Commercial Bill sought, for the purposes of the Commercial Company, to enact the very clause the London County Council were seeking to repeal; and if the Commercial Company were not present to show cause why the clause should not be repealed, the Commercial Company's clause, might, by implication, be struck out before they were heard. The clause in the Commercial Company's Bill was as follows: "The burner for testing gas supplied by the Company shall be Sugg's 'London' argand, as prescribed by section 34 of the Act of 1875, and, in making such testing, shall be so used that the gas shall, notwithstanding anything in section 52 of the Act of 1875, be burnt at such a rate as shall give a light equal to 16 candles." That was word for word the same as section 6 of the South Metropolitan Company's Act of 1900.

The Chairman: Are the County Council opposing your Bill?

Mr. Balfour Browne: Yes; on this very clause. It seems to me monstrous that I should be out of the room while this is discussed. It will be a matter of scientific evidence; and I want to cross-examine their witnesses when they come in on their Bill.

The Chairman: Will not the right course be to ask the Committee to hear both Bills together?

Mr. Balfour Browne: I agree.

The Chairman: I cannot order it.

Mr. Balfour Browne: But you can give me a *locus* to be heard against them; and then I can suggest that the right course is that, so far as these two clauses are concerned, they should be heard as one Bill.

Sir Chandos Leigh: Is there any objection?

Mr. Talbot (representing the London County Council): I do not think if the Commercial Gas Company ask the Committee before they enter upon this part of the London County Council Bill to defer their decision upon it until the Commercial Bill is before them——

Mr. Balfour Browne: Merely deferring a decision would not do, because then I should not be able to cross-examine their witnesses. It is possible the South Metropolitan Company may do my work for me; but I should be there to ask a few questions.

The Chairman: Is not Mr. Talbot prepared to approve of that - that the two Bills should be heard together?

Mr. Talbot: I do not think I have any objection to that. I should have been bound to resist the *locus*, because to grant it would be, it seems to me, subversive of all principles.

Eventually it was understood that Mr. Balfour Browne withdrew his petition on Mr. Talbot stating that, as far as he saw, he had no objection to the two Bills being heard together as regarded this one clause—that was to say, that every witness the County Council called in favour of their proposal with regard to the South Metropolitan clause should be available for his learned friend to cross-examine before the Committee gave a decision on either Bill. Subject to the consent of the Committee, he thought that was reasonable.

COMMITTEE ON UNOPPOSED BILLS.

The Deputy-Chairman of Committees (the Right Hon. Arthur F. Jeffreys) had before him last Tuesday several Bills in which readers of the "JOURNAL" are interested.

EAST ARDSLEY GAS BILL.

It may be remembered that the East Ardsley Gas Bill stood first of the Gas Bills referred to the Committee presided over by Sir Henry Aubrey-Fletcher, who commenced their sittings last Tuesday. The Morley Corporation, however, withdrew their petition; and the Bill was removed from the group. Its object is to incorporate and confer additional powers on the East Ardsley Gas Company, Limited, which was formed in 1871 for the purpose of supplying East Ardsley and the neighbourhood with gas. It authorizes the immediate increase of the capital from £12,000 to £24,000, and empowers the Company to raise £12,000 in addition. The dividends are 10 per cent. on the original, and 7 per cent. on the new capital. The promoters were represented by Messrs. Rees and Frere, Parliamentary Agents. Mr. Frere explained that, the Company having raised and spent all their capital, it was necessary to obtain reconstitution. Mr. Jeffreys suggested whether it was worth while for a Company with so small a capital to come to Parliament. Mr. Frere replied that this was the only way in which they could get more money. The Bill was allowed to pass the Committee stage, and was subsequently reported to the House for third reading. The report set forth that a report from the Local Government Board relative to clauses 55, 62, and 67 had been considered by the Committee. With regard to clause 55, the promoters had reduced the standard price from 5s. to 4s. 6d.; and after hearing their explanations, the Committee were satisfied that the reduced standard was a reasonable one, and had allowed it accordingly. With regard to clause 62, the variation from the Model Clause appeared to the Committee to be reasonable, and they had not thought it necessary to amend the clause. As to clause 67, it appeared to the Committee that the power to allow discounts to consumers at a rate not exceeding 20 per cent., as proposed, was a reasonable one, and might be sanctioned. Provision was made in the clause for notice being endorsed on the demand notes of discounts or rebates in consideration of prompt payment being allowed by the Company.

WINCHESTER WATER AND GAS BILL.

In the case of the Winchester Water and Gas Bill, it was announced that the promoters (who were represented by Messrs. Martin and Leslie) had decided to meet a suggestion previously made by the authorities of the House that there should be a basis of rating which could be ascertained by everybody in the event of a dispute. They had therefore adopted a clause in the Runcorn Act of 1893, the result of which would be that all the rates would be levied on the gross estimated rental of the premises supplied. There would be a maximum dividend of 7 per cent. per annum. The Bill was allowed to go forward. A report was presented to the House stating that a report from the Local Government Board relative to certain clauses of the Bill had been considered by the Committee, who had amended the Bill to give effect to such of the recommendations therein as they considered necessary, for the following reasons: With regard to clause 28, the Committee considered the report with reference to the operation of section 42 of the Company's Act of 1865, which provides that the water-rates shall be payable according to the annual rack-rent or value of the premises supplied, and heard evidence from the promoters as to the probable effect of compliance with the suggestion that the basis of assessment should be the rateable value, or gross estimated rental as appearing in the valuation list. It seemed that the Company would be losers to some extent by calculating the rates on the gross estimated rental, and that the deficiency would therefore be still greater if the annual values were taken. The Committee were, however, of opinion that the rates should be based upon an assessment made by the recognized authority, the Union Assessment Committee; and the promoters accordingly brought up an amendment, whereby the whole of the water-rates, both in the existing and future water limits of the Company, shall be based upon the gross estimated rental as shown by the valuation list, or if there is no such list in force, by the last rate made for the relief of the poor. In clause 33, an insertion was made to meet the criticism of the Board; and for clause 51 the Model Clauses were substituted, as suggested by the Board.

BRIDGWATER GAS BILL.

The Bridgwater Gas Bill likewise came under consideration. Mr. Johnson (of Messrs. Torr and Co.), who appeared for the promoters, the Bridgwater Gas Company, said they had largely exceeded their money powers. There had been constant expenditure on works since 1883, and the outlay on capital account amounted to £19,896. The net earnings in the last five years had averaged £3290 annually. The main object of the Bill was to increase the capital to £84,000, and to authorize the Company to raise an additional amount not exceeding £42,000. The standard rate of dividend was to be 10 per cent. in the case of the "A" stock, amounting to £18,000, and 5 per cent. on the other stock—both subject to the sliding-scale. Mr. Jeffreys asked what would happen to the remaining profits, if any, after the 10 and 5 per cent. dividends had been paid. The Speaker's Counsel (Sir Chandos Leigh) said that both consumers and shareholders would benefit by them. The case was exactly parallel to that of the South Metropolitan Gas Company, who had done so well under the arrangement that, though there was originally a limit of 10 per cent., the shareholders had been actually paid 13 per cent. The Bill, like the others, passed the Committee stage, and was subsequently reported.

Shipley and the Saltaire Gas-Works.—The gas supply rights for the Saltaire portion of the Shipley township have been acquired by the Shipley District Council from the firm of Sir Titus Salt, Bart., Sons, and Co. The purchase price is stated to be £33,000.

HOUSE OF LORDS COMMITTEE.

Friday, March 20.

(*Before the Earl of* DARTREY, *Chairman, the Earl of* NORTHESK, *Lord* LILFORD, *Lord* CAREW, *and Lord* SALTOUN.)

HEXHAM GAS BILL.

The object of this Bill is to enable the Hexham Gas Company to raise further capital, and to convert the existing 10 and 7 per cent. shares into an equivalent amount of 5 per cent. stock.

Mr. RAM, K.C., and Mr. DILL appeared for the promoters. The petitioners in opposition were represented as follows: Hexham Urban District Council, by Mr. WEDDERBURN, K.C., and Mr. SQUAREY; Corbridge Gas Company, Limited, by Mr. SHIRESS WILL, K.C.

Mr. RAM, in opening the case for the Bill, said that previous to 1881 the Company was a limited concern without statutory powers; but in that year they were incorporated as a statutory undertaking, with a maximum price of 4s. 9d. per 1000 cubic feet for Hexham and 5s. 9d. for outside districts. Previous to that date, the Company had issued £8100 of capital bearing 10 per cent. interest; and by the Act of 1881, they were authorized to issue £15,900 more, bearing 7 per cent. dividend, with borrowing powers as to £8000 further. The Company had exercised their capital powers almost to the full—only £600 of the loan capital remaining to be issued. There had been a great and steady rise for years in the sale of gas; and the Company were therefore compelled to come to Parliament for further capital. The amount as to which power was sought was £30,000, with borrowing powers as to £20,000, which included £7400 already raised. There was no shadow of complaint whatever against the Company. They asked also for power to consolidate the existing share capital, which bore interest at 10 and 7 per cent., and to convert it into ordinary stock exactly equivalent to the existing stock bearing 5 per cent. interest. The £30,000 of additional capital would be issued under the auction clauses, and therefore on terms most favourable to the consumers. The Company proposed to abandon the maximum price system, and to come under the sliding-scale; the standard price proposed being 3s. 6d. per 1000 cubic feet for the inside district and 1s. more for the outside area. The price charged in 1881 was 4s. 2d. per 1000 cubic feet, in 1882 3s. 9d., and in 1883 3s. 4d., at which figure it remained until 1902, when, in consequence of cheap coal and other favourable circumstances, it was further reduced to 3s. 2d. With regard to the standard price, Counsel said he was anxious to conciliate his opponents; and he was prepared to reduce it to 3s. 4d. if that would please his learned friend.

Mr. WEDDERBURN said the reduction would please, but not satisfy, him. It did not go far enough.

Mr. RAM (continuing) said the capital which the Committee were asked to grant would, according to the present rate of increase, carry the Company on for only ten or twelve years. Turning to the petition of the Hexham Council, he said they objected to the proposed conversion, which they alleged would increase the price that the Council would have to pay for the concern should they become the purchasers of it at some future date. The Council had never approached the Company with a view to purchase; and a desire to do so was not indicated even now in the petition. What was proposed would not affect the purchase price by a single farthing. Then the Council urged that the conversion clause would enable the Company to add a large sum beyond what they were at present entitled to add to a reserve fund. The Company had power already, under the General Act of 1847, to establish a reserve fund; they were now simply asking for power to divide it into two portions—one a reserve fund, and one an insurance fund. The proposed division of the fund would be for the advantage of the consumers; and, further, the insurance fund could only be filled up by allocating to it money which the shareholders would be fully entitled to divide as dividends. The Council next alleged that the standard price proposed was far too high, having regard to the price actually being charged. The Company, however, were only asking for a standard rate which was 4d. above the price at which they were now supplying. The Council also submitted that the provisions of the Act of 1881 with regard to the appointment of the Directors should be amended so as to provide that the number should be seven, and so that the petitioners should be entitled to appoint a certain proportion of the Directors, and that some provision should be inserted restricting the minimum rate of interest upon moneys to be raised hereafter by the Company on mortgage. These requests were absolutely novel. The petition next directed attention to the Company's Act of 1881, in which there was reference to the Company being established for the purpose of manufacturing gas and producing heat and light by electricity or otherwise. It was true that since 1881 they had possessed the powers to supply electricity; but there had never been the slightest demand for it. If, however, any body of persons asked for a supply, the Company were ready to give it. The Council asked that the Company might be deprived of this power, because they had never attempted to use it, and had not the power to make a charge even if they gave a supply. If a demand arose, a supply, by agreement with the Local Authority, could be given. The only other petition was that of the Corbridge Gas Company, who objected to clause 33, which stated: "The Company may contract with any local authority, company, or persons beyond the Company's limits of supply (but only with the consent in writing of the local authority of the district within which the supply is to be given, and of any company or person supplying gas under parliamentary powers in that district) for the supply to them respectively of gas in bulk," &c. The Corbridge Company was not a statutory concern, and therefore would not come under that clause. To meet this, the promoters had offered to give them an undertaking which would place them in the same position as a statutory company.

Mr. SHIRESS WILL said if a provision were inserted in the Bill that would satisfy him.

Mr. RAM objected to do this, because it would be placing a non-statutory Company on the same footing as a statutory Company. In

conclusion, he pointed out that if the Committee granted the Corbridge Company the power they asked, they would create rights in regard to the Corbridge Local Authority, who were not present to protect themselves.

Mr. *Joseph Hepworth*, examined by Mr. DILL, said he was a Director of the Hexham Gas Company. The area supplied was becoming a very popular health resort and residential district, being conveniently near to Newcastle. Having regard to all the circumstances, 3s. 6d. per 1000 cubic feet was a very reasonable figure to fix as the standard. The Company desired to retain their power to supply electricity, and were quite ready to listen to any demand for it that might be made.

Cross-examined by Mr. SHIRESS WILL: The promoters did not desire to harm the Corbridge Gas Company. They offered them an agreement not to sell in bulk in their area without their consent; but they objected to insert a proviso to that effect, for the reasons already given.

Cross-examined by Mr. WEDDERBURN: The capital power sought was to some extent for the supply of the district outside Hexham.

Mr. WEDDERBURN: Would it be a fair thing for us to ask either that you should not, to our prejudice, spend the capital you get outside Hexham, or that, so far as you spend it outside, you should not by so doing delay a reduction in the price of gas inside?

Witness: I would say that the consumption of gas outside the district is amply paid for by the extra price charged. The consumption of gas outside has never operated against the consumer inside. We charge the same price in the district outside, but give no discount.

Mr. WEDDERBURN, in reply to the Chairman, said his contention was that the Company had reached a position so flourishing that if they stood as they were to-day, there was nothing between the consumer and a reduction in price of gas—all the surplus profits must go in reduction of the price—and the moment the cup was at the lip of the consumer, so to speak, this Bill came in to dash it away.

In further cross-examination, witness said the standard price proposed was originally 3s. 9d.; but it was now 3s. 6d., and Mr. Ram had offered to make it 3s. 4d.

Mr. RAM: We have offered to take 3s. 4d. in order to save the expense of going into all these details; but I am prepared to substantiate a higher price.

Mr. WEDDERBURN: Our case is 2s. 8d.; and that we can substantiate.

In reply to further questions, witness said the effect of the Bill would be that the dividends would be raised ½ per cent. above what they were at present; but the Company would, of course, have to take the risk of the sliding-scale the other way. The price of 2s. 8d. suggested was ridiculous. Under their Act of 1881, the Company had power to supply electricity for lighting purposes; but they had no authority to lay down mains, and so forth. They had never supplied electricity, and had never been asked for it; and, apart from irregular and non-legal agreements, they could not supply it. They were, however, quite ready to supply current if there was a demand for it.

The CHAIRMAN, at this point, said there was a feeling among the Committee that Mr. Ram should make a further concession in the matter of the standard price.

The proceedings were suspended for a short time, after which

Mr. RAM said he had consulted his clients; and, with every desire to meet the other side, they could not go below 3s. 3d.

Mr. WEDDERBURN said it was impossible to accept the offer.

Mr. *Herbert Lees*, the Engineer and Secretary of the Company, stated that between 1881 and 1891 there was an increase of 82 per cent., and between 1891 and 1901 an increase of 101 per cent., in the sale of gas. In 1902, as compared with 1901, there was an increase of 11 per cent. The capital sought, at the present rate of increase, would not last longer than ten or twelve years. The recent reduction in price was owing to the Company making a favourable forward coal contract.

Cross-examined by Mr. WEDDERBURN: The electricity powers of the Company were incomplete; but he did not think the possession of such powers was an encouragement to, or a check upon, electric enterprise in the district.

By the CHAIRMAN: Last year, when they sold gas at 3s. 2d. or 2s. 11½d. net., after deducting discounts, they added nothing to the reserve fund; but they paid off some back-dividends.

Mr. *Corbet Woodall* said his impression was that 3s. 4d. was a fair standard price for the Company. The actual cost of making gas and paying dividends was 3s., as nearly as might be; and it was customary to allow some margin for variations beyond the control of the Company. For this, he did not think 4d. was too large. Quite recently the cost of making gas was 3s. 1d.; and if they had had to pay the current price for coal, this figure would have been much higher. The fixing of the standard price did not fix the selling price of gas. The Committee might reduce the standard price; but by so doing they did not enable the Company to supply more cheaply. To reduce the standard price in this case by 4d., would mean to the consumers of gas in Hexham only £142 per annum. This was the whole interest the consumers had in the dispute between the Council and the Company. It was distinctly disadvantageous that the dividends of a company should be in considerable risk of diminution, because if the dividends decreased the rate at which new capital was issued would fall, and thus the amount of the premiums (which were expended on capital account without bearing interest) would fall. Therefore he thought the Committee, without risk of injuring the consumers in Hexham, might allow the standard of 3s. 4d. If a company were to be punished by having their standard price fixed at a low figure because they had succeeded in reducing the price of gas to a low point, it would be an object-lesson for the future to companies about to apply to Parliament. It was clear that if the Hexham Gas Company had kept the price at 3s. 4d., the Council would not have contended for a lower figure.

Mr. WEDDERBURN, in cross-examination: If you could be certain of what the selling price of gas was going to be, you would fix the standard price at the selling price?

Witness: I would not trouble about a selling price. I would not bother about a sliding-scale at all. If you could be sure that the price at which you could sell gas was to be constant, there would be no sense at all in a sliding-scale.

This concluded the case for the promoters.

Mr. SHIRESS WILL addressed the Committee for the Corbridge Gas Company. He maintained that the fact of their being non-statutory did not debar a company from protection.

The CHAIRMAN: As a vested interest.

Mr. SHIRESS WILL: That is so. The learned Counsel cited cases in which protection was given to non-statutory companies in Acts of Parliament. As to the verbal undertaking given by his learned friend, it was a well-known principle of law that if Parliament gave to a company certain powers, it was for the public advantage. Therefore, no company which received such powers through an Act could undertake that they would not use them—and this was the effect of his learned friend's undertaking, which would not be binding on the successors of the present Directors. He asked that protection should be given to his clients.

Mr. WEDDERBURN then put before the Committee the case for the Urban District Council. He called

Mr. *E. H. Stevenson*, who said that the sliding-scale was not meant entirely for the consumer. Its object was to make a company, so to speak, work better than its best so that they should get something for selling gas more cheaply. The promoting Company had practically no back dividends to pay, and their position was really a very prosperous one. The gas had been at a net price of 3s. for ten years. The standard price ought to be a sort of line above which or below which, in the course of years, the price might be expected to fluctuate. If the supply advanced annually at the rate of 10 per cent., the prosperity of the Company must improve. A fair standard price, if there were no discounts to pay, would be 2s. 8d.

In cross-examination by Mr. RAM, witness said that no doubt the Company must have fresh capital.

Mr. RAM: You are proposing to give us for the standard price 1d. above the figure of the year when we got the lowest price for gas?

Witness: And made the biggest profit. In the event of a strike or anything of that sort, the insurance fund would be used; and that fund came out of the pockets of the consumers.

Continuing, witness said the Company should be in such a position that they would earn their standard rate of dividend; and until they improved the consumers' position, they ought not to get more. He put the standard price at what he thought was a fair and reasonable figure, 2s. 8d.—giving a slight margin beyond the figure at which they could earn their dividend.

Mr. RAM: You take the year in which we were most successful—1902—when we sold gas at 3s. 2d.; and you propose to take 6d. off that and fix the standard at 2s. 8d.?

Witness: I take the last account year, and I ascertain whether the price then charged was proper and fair. If it were not, I should correct it. I find that last year the price was not fair and reasonable to the consumer, or would not be in the future, because you make practically 4½d. extra profit after taking off 2½d. discount.

Monday, March 23.

On the resumption of the proceedings to-day,

Mr. WEDDERBURN, in addressing the Committee on behalf of the Hexham Urban District Council, said the broad matter they had to consider was what would be the position of the consumers if the Bill were not to pass—if there was no sliding-scale arrangement established, no conversion, and if the capital power sought was not given or strictly limited; and what would be the position of the consumers if the Bill did pass? Either the Company must elect to have very little additional capital and a high standard price, or a large additional capital and a low standard price. The truth was that the Company needed further capital, and that they might look forward to seeing Hexham almost a suburb of Newcastle, and with a gas supply nearly as cheap as it was in Newcastle—namely, 1s. 10½d. But for the Bill, the position would be that next year, and in the years to come, there would be in the hands of the Company a sum of at least £700, which would have to go in reduction of the price of gas. In 1902, if they had not had to pay that which they would no longer have to pay to any extent—back-dividends and sums for reserve—they could have supplied gas at 2s. 7¼d.; and that price would have been a falling one, because, according to the promoters, the Company would continue to be prosperous. The standard price ought to be what, as far as one could see, was the normal, *plus* a small margin for contingencies, if the tendency was for the price to rise; but if the tendency was for the price to fall—as was the case here—it ought perhaps to be a little below the normal. The question was what price was the Company likely to be able to charge for gas. The real price in 1903 was 2s. 10d., and not 3s., because from the 3s. the discount had to be deducted. This price was rapidly going down; and, making allowance for the amount paid for back-dividends and to fill the Company's reserve fund, it would have been no more than 2s. 7¼d. Thus 2s. 10d. was now the top price. The tendency was to fall; and 2s. 7¼d. would have been the real price. He submitted therefore that 2s. 8d. was a fair standard, especially as there was no chance of gas rising in the district. This figure would enable the Company to pay their maximum dividends, and, in time, more than their maximum dividends. Therefore it should be fixed at not more than that. Moreover, the Bill would put £3800 (the extra amount which the Company would have power to place to reserve) between the consumer and a further reduction in the price of gas, which was another reason why the standard should be reduced. He (Mr. Wedderburn) earlier in the case offered to accept a standard of 3s. if the Company would give up their electrical powers. That offer was refused; and he now asked the Committee to abrogate those powers and put the price at 2s. 8d. Apart from any non-legal agreement, the Company could not supply electricity at all, for they had no power to lay mains. If the Committee now thought fit to take away these

electrical powers, he would be content that the margin of the standard over the 2s 7d. should be more than 1d.—say, 2s. 9d. or 2s. 10d.

Mr. RAM, in replying, referred to the case of the Corbridge Gas Company, and said he objected to insert in the Bill the provision sought by that Company for their protection, because it would give them rights against the authority of the parish of Corbridge, which they did not now possess. With regard to the Hexham opposition, he declared that the electricity clause was used as a means of squeezing something out of the Company. It was true the Company had not exercised the electrical powers which they obtained in 1881—the reason being that no one had demanded current. But they were ready to supply it; and it could only be to the advantage of the district that the powers should remain with them.

The CHAIRMAN, after a brief consultation with the other members of the Committee, interposed and said: We need not trouble you any further about the electrical powers, because the Committee see no reason for repealing that provision; and with regard to the protection of Corbridge, the Committee are not disposed to amend the Bill. This leaves the question of standard price.

Mr. RAM said that without such a standard price as would give the Company a reasonable hope of working successfully, and with a fair profit to the shareholders, the Bill had better not pass. At present, the Company were entitled to a maximum dividend of 7 per cent.; and they would be quite content to go on as they were.

Mr. SQUAREY: As far as we are concerned, we should be quite content if my friend would drop his sliding-scale and standard and remain as he is.

Mr. RAM said he did not think it would be possible to ask for an entirely different Bill from that which had been brought forward, and different from the form which Parliament always approved in the case of gas companies. The question therefore was what was to be the standard. Even now they were prepared to take the 3s. 3d. referred to on Friday; but below that they could not safely go. If the price were below that, it would be certain that the shareholders would take all the risk and the consumers all the gain. The standard price should be so fixed that in good times both shareholders and consumers should get the advantage, and so that in bad times the shareholders (in this case of a blameless Company) should not bear all the loss which must fall on somebody when coal was dear, or there was a strike, or when for any other reason it was impossible to manufacture gas very cheaply. He reviewed the evidence with regard to the standard price, and objected strongly to the selection of the year when the conditions were most favourable to the Company, and when, therefore, they were selling at the lowest price in their history, and basing the standard price upon those conditions. He also took exception to the subtraction of the discounts from the price charged by the Company and presenting the figure thus obtained as the real selling price, pointing out that the giving of discounts saved the cost of collectors. If discounts were not given, collectors would have to be employed, in which case the cost would be much greater than the discounts allowed. In conclusion, he observed that if 3s., or anything under 3s. 3d., was fixed, there would be no margin to meet emergencies—3s. 3d. was the very lowest figure at which the Company thought they could work in the future.

The CHAIRMAN, after deliberating a few moments with his colleagues, said: The Committee think that the Bill should be amended so as to make 3s. 2d. the standard price. I think that settles all the points.

The clauses were then adjusted in accordance with the decision of the Committee; and the Bill, as amended, was ordered to be reported to the House.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 24.

(*Before Sir* H. AUBREY-FLETCHER, *Chairman, Mr.* J. A. DEWAR, *Mr.* MACONOCHIE, *and Mr.* TOULMIN.)

NORTH MIDDLESEX GAS BILL.

This Bill is to enable the North Middlesex Gas Company to raise additional capital, establish a renewal fund, make certain alterations with regard to the operation of the sliding-scale, and for other purposes.

Sir R. LITTLER, K.C., Mr. BAGGALLAY, K.C., Mr. HONORATUS LLOYD, and Mr. INGLEBY ODDIE appeared for the promoters. The petitioners in opposition were represented as follows: Hendon Urban District Council by Mr. ERSKINE POLLOCK, K.C., Mr. BARTLEY DENNIS, Mr. J. P. OLIVER; and the Finchley Urban District Council, by Mr. WEDDERBURN, K.C.

Sir R. LITTLER, in opening the case, said the Company, which was incorporated as a joint-stock undertaking in 1862, subsequently obtained two Provisional Orders, and in 1895 an Act. They had had an unusually active career, owing very largely to the enormous increase in population which had been going on in the Outer Ring of London. In 1895, they asked for considerably more capital than, owing to the representations of the two Local Authorities, was granted; and the result was that in eight years they had to come again to Parliament. It was now proposed to raise £120,000, with a limit of dividend of 7 per cent., or 6 per cent. if issued as preference stock. One of the petitioners asked that the preference stock should be offered at 5 per cent. The answer to this was that 6 per cent. stock fetched a larger premium than one at 5 per cent.; and therefore the issue at the higher percentage was for the benefit of the public. The usual borrowing powers of one-third additional were also sought. It was proposed to continue the present sliding-scale arrangement, as under the Act of 1895, with the standard price of 4s. 3d., and a variation of ½ per cent. for each increase or diminution of the price of gas by 1d. per 1000 cubic feet; but it was suggested that the Company should be able to alter their price half yearly instead of yearly as at present. Provision for the establishment of a renewal fund was also made. The intention was to set aside ½ per cent. on the paid up capital until the fund became equal to one-fifth of it. When it reached this proportion, the interest on the fund was to be available for dividends.

The Hendon District Council complained of the quality of the gas, which they said was deficient in illuminating power, pressure, and purity; and, on many occasions, not equal to the standard prescribed by the Act. As far as the information of the promoters had went, this was not correct. Whenever testing had taken place, it had shown that the gas was in excess of the requirements of the Act. Further, neither Hendon nor Finchley had complained. The petitioners next objected to the price charged, and said it was high compared with that of the Gaslight and Coke Company, who supplied part of the district. The price the North Middlesex Company charged was 3s. 10d., whereas that of the Gaslight and Coke Company was 3s. But the latter Company had 180 consumers per mile of main, whereas the promoters had only 72. Moreover, the average consumption per consumer in the case of the larger Company was 83,000 cubic feet per annum, while in that of the latter the figure was 35,000 cubic feet; and every atom of the Middlesex Company's coal was carried by railway, whereas a very large proportion of the other Company's coal was seaborne. The latter item alone was almost sufficient to account for the difference in price. The petitioners also said the Company ought to have reduced their standard. There was only one case—that of the Lea Bridge Gas Company—in which it had been reduced; but there the Company had never charged the standard price, and were obliged to admit it. Here the circumstances were entirely different; and to reduce the standard would be to diminish the Company's security. In 1894, the price they were charging was 4s. 3d. per 1000 cubic feet; and this was the figure at which the standard was fixed in the Act of the next year, though it was usual to put the standard a little above the price actually being charged, in order to allow a margin. The Company charged 4s. 3d. in 1895; in 1896, first half 4s. 3d., second half 4s.; in 1898 and 1899, 4s.; in 1900, first half 4s., second half 4s. 5d. (this being the year when the price of coal rose considerably); in 1901, first half 4s. 3d., second half 4s.; and 1902, first half 4s., second half 3s. 10d. Owing to the Company being compelled to calculate the standard price once only per annum in no fewer than five out of the eight years since 1895, the shareholders had to submit to a lower dividend than would have been justified by the results each half year if taken by itself. Hence the proposed half-yearly alteration with regard to the sliding-scale. The capital raised by the Company per million cubic feet sold was, in 1901 £898, which compared favourably with £850, the fair average for such a company as this. Another allegation of the petition was that the standard price was much in excess of what ought to be allowed. He could not understand this. It was not contemplated that the Company should never make any profit out of the sliding-scale. Then the petition said the large capital powers sought were out of all proportion to the requirements, and if granted would relieve the Company of all need to come to Parliament for many years. The Committee would hear, however, from most capable gas engineers, that the capital asked for would not last more than about ten years. So rapidly was the district developing, that the average increase in consumption had been about 11 per cent. per annum. Then the petitioners asked that there should be another testing-place besides the one at the works. This demand, however, he thought unreasonable; and therefore it would be resisted. In conclusion, Counsel said the only difference between the Hendon petition, to which he had been referring, and that from Finchley was that in the latter there was no complaint about supply.

The following evidence was then given.

Mr. *A. M. Paddon*, one of the Directors of the Company, examined by Mr. HONORATUS LLOYD, said that under the Act of 1895 the total capital was fixed at £80,000 share and £20,000 loan; and the sliding-scale was established. Of the original capital, £15,000 bore a standard dividend of 10 per cent., and £30,000 one of 7 per cent.; £35,000 of additional capital authorized by the Act also bearing the latter dividend. The standard price was 4s. 3d. All this capital had been, or was about to be, expended. In 1895 the capital per million cubic feet of gas sold was £1063; whereas at the present time it was £898. Apparently, therefore, the capital granted in 1895 had been economically expended. The district was to some extent rural, particularly round the works; so that there was a length of unproductive main before they reached the consumers. The sale of gas had largely increased; the rate during the past five years having averaged more than 11 per cent. compound per annum. In 1894, the sale was 56½ millions; now it was 109 millions. It would be reasonable to anticipate an even larger rate of increase in future; and therefore the further capital asked for would be necessary to carry the concern over the next ten or twelve years. Calculating upon capital expenditure at the rate of £850 per million cubic feet of gas sold, the outlay required to meet the increase which he anticipated by the year 1912 would be £170,000. During the eight years the present standard price had been in operation, the Company had often been entitled to distribute larger dividends than they had declared; but they had not done so, preferring to build up a solid business. He objected very strongly to the suggested reduction in the standard. The dividend was paid, and the accounts were kept, half yearly; and the Company therefore asked that the dividend should be governed by the price in the six months to which it referred, and that they should not be penalized by a price which did not apply to that period. He explained the object of the renewal fund. With regard to the complaints as to the quality of the gas, he said the Company had been almost completely exempt from them during the last few years. It was the policy of the Company to supply gas well above the required illuminating power; and the tests showed that such gas had been distributed. The question of an extra testing-station was threshed out in Parliament in 1895, when it was refused. If an additional station were granted, it would merely mean extra expense; and the results would be very illusory.

Cross-examined by Mr. WEDDERBURN: His chief objection to a testing-station, even if the Local Authorities paid for it, was that the gas tested there would not be representative of the gas distributed through the district. As to the renewal fund, he should prefer a little more liberal treatment than was bestowed in the case of Plymouth, where the fund was limited to one-tenth (instead of one-fifth as here

proposed) of the capital of the Company. He denied that this fund would stand between the consumers and a reduction in the price of gas. The sole object in seeking exemption from the auction clauses in regard to the issue of debenture capital was in order that the Company might raise capital on the best terms. The proposal was made in view of the experience gained since 1895. He did not think there would be any objection to alter the proposed rate of interest (6 per cent.) on the debenture stock to 5 per cent., and thus conform to the rate stated in the Model Bill. In the Bill the pressure was 6-10ths and 8-10ths; and if it would satisfy the petitioners, the Company would agree to make it the latter figure and 10-10ths.

Cross-examined by Mr. BARTLEY DENNIS: In the last few years the capital expenditure of the Company had been about £5020 per annum; and in the next ten years he estimated it would average £16,000. In the last few years, however, some very important items of expenditure had not been touched, such as those relating to the carbonizing plant. When this expenditure came, it would be extremely heavy—probably £20,000 in one year. The Company were now supplying about 109 million cubic feet per annum. On the basis of 11½ per cent. compound rate of increase, he calculated that in 1912 they would be selling 309 millions. The present price of 3s. 10d. had only been charged since July last. At that time, however, the Company had no definite idea of promoting the present Bill. It was absurd to suggest that the future capital expenditure need only be £500 per million cubic feet, and that on this basis, and taking the increase at 8 per cent. per annum, £75,000 was all the capital the Company needed for ten years.

At this point the mid-day adjournment took place. On the re-assembling of the parties,

Mr. HONORATUS LLOYD informed the Committee that, during the interval, terms had been agreed as follows: One additional testing-place to be established at Hendon, at the expense of the opponents, who are to have the right to test the gas there at any time without notice to the Company. The interest on so much of the capital as is raised by preference shares to be 5 instead of 6 per cent.; the debenture stock to be raised at 4 per cent.; and the renewal fund to be limited to a sum not exceeding one-tenth of the capital.

The preamble of the Bill was then formally declared proved; and the further proceedings were adjourned till the next day to enable clauses to be prepared giving effect to the terms agreed upon.

Wednesday, March 25.

On the resumption of the proceedings to-day,

Mr. HONORATUS LLOYD said that, in the agreement come to on the previous day, an undertaking was given to provide a testing-station between the two Local Authorities. The result of that operation might be that the Company would be liable to penalties. The ordinary corollary to this was to excuse the Company in the event of any failure taking place from unavoidable cause or accident. He understood that the opponents were under the impression that this was part of the general law. But it was usually introduced into special legislation; and he asked that it should be so introduced.

Mr. WEDDERBURN thought they were all agreed as to this. The arrangement with regard to pressure would, he understood, be inserted in the clause.

Mr. HONORATUS LLOYD assented.

Clauses were then added to the Bill to the following effect: (1) The Hendon Urban District Council should, at their own expense, before June 30, 1904, provide a testing-place at the Council Offices, Hendon, which should be deemed to be an official testing-place in conformity with the provisions of the Gas-Works Clauses Act, 1871, and should fix the necessary apparatus and machinery; (2) the apparatus for, and the mode of, testing the gas might be such, if the Company so desired, as should from time to time be prescribed by the Metropolitan Gas Referees, such further or substituted apparatus to be provided by the Company at their own expense; (3) any gas examiner might test the illuminating power, purity, and pressure of the gas supplied by the Company at any time of the day or night, and no forfeiture should be incurred where it was proved before the Justices that the defect arose from unavoidable cause or accident.

The remaining clauses were then adjusted, and the Bill was ordered to be reported to the House for third reading.

Cheap Gas for Power at Long Eaton.—In the article on gas affairs at Long Eaton in the last number of the "JOURNAL," it was mentioned that, as from Jan. 1, 1902, the Directors of the Gas Company had reduced the price of gas used in engines to a uniform rate of 2s. 5d. per 1000 cubic feet. We learn that they have now taken off 3d., and brought the figure down to 2s. 2d. net for monthly accounts, to be paid before the 10th of each month. The Company's Engineer and Secretary (Mr. G. Stevenson) points out that, as the gas has a heating value of 660 British thermal units per cubic foot, the exceptionally low charge makes it the cheapest source of power in the town. Electricity must, he says, be sold at ½d. per unit to equal it; and it is relatively cheaper than any producer gas on the market.

Oldbury Gas Undertaking.—The report of the Gas Department of the Oldbury District Council for the year ended the 31st of December last has just been issued by the General Manager (Mr. A. Cooke). The total amount owing on the loan account at that date was £61,529. During the year, a sum of £1472 was spent on new meters, mains, service-pipes, &c., bringing up the aggregate expenditure to £80,671. The total amount borrowed up to Dec. 31 was £79,199; while £17,669 had been repaid. The income from the sale of gas was £14,093; residuals brought in £4381; and other items made the total receipts £18,720, compared with £17,962 in the previous year. The manufacture of gas cost £10,132; distribution, £1407; the total expenditure being £13,890, against £14,353 in 1901. The net profit on the year's working was £1297, compared with £82 in 1901.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Tuesday, March 17.

(*Before Mr. Justice* JOYCE.)

Kent Water-Works Company v. Ellis.

This was an action to recover water-rates due from the defendant, as owner of a large number of houses in Old Charlton, for the two quarters ending Christmas, 1901, and a like period ending Midsummer, 1902.

Mr. R. M. BRAY, K.C., and Mr. HOLLAMS appeared for the plaintiffs, Mr. JAMES ELLIS, the defendant, conducted his own case.

Mr. BRAY stated that the houses in question were let for the most part on weekly or short tenancies, and their rateable values were between £20 and £30. Some were below £20 a year; and, of course, for those the owner would have to pay the water-rate. In January, 1900, the defendant entered into an agreement, dated the 5th of that month, with the plaintiffs, upon which the action turned; and it continued in force until Midsummer, 1902, when it was determined. It was thereby agreed that during its continuance the defendant should pay to the Company the statutory water-rates which they were entitled to charge in respect of the houses belonging to him which should have communication-pipes connected directly or indirectly with their mains for the purpose of water supply, and whether such houses were occupied or unoccupied, "such payments to become due on June 24 and Dec. 25 in each year," instead of quarterly according to the statute. This would enable the defendant to get in his rents. The agreement went on to specify that the payments were to be in respect of the whole of the then two preceding quarters; and if they were made by the defendant within 42 days after June 24 and Dec. 25 respectively, the Company would allow him a discount or rebate therefrom of 5 per cent. from the amounts paid—this discount to be in satisfaction of every claim, deduction, or allowance in respect of empty houses or otherwise. But if payment was not made within the 42 days, the rates were to be payable in full. The agreement was to be determinable by either party on June 24 or Dec. 25 in any year by giving six months' notice in writing. The defendant paid the rates under the agreement, and obtained his abatement, up to September, 1901; and then correspondence began with him. The plaintiffs' Secretary (Mr. A. Dickson, jun.) wrote to him to the effect that the period of 42 days had expired, but that he had not made any payment to entitle him to the discount. Defendant replied that he was going to call and discuss the agreement. He said he found that it worked most disadvantageously to him, and that he had lost a great deal more than the 5 per cent. allowed him. He subsequently sent a cheque for the two quarters then due; and he was now sued for the four succeeding quarters. Plaintiffs replied that there was no justification for making any further allowance to the defendant under the agreement; and on the 25th of October he gave notice determining it in the following June. From that date, therefore, the agreement was at an end. The contention of the defendant now appeared to be that the agreement was null and void because it was without any consideration at all, and that he might get rid of it at any time because it did not bind him, but merely gave him an option of paying within 42 days and getting 5 per cent. discount. In the first clause of the agreement, however, it was distinctly stated that the defendant should pay. This was the only point raised on the pleadings. Defendant had paid into Court certain small sums which the plaintiffs had accepted in part satisfaction; but there was still a balance of £145 odd due from him. Defendant did not dispute the amounts; and the whole question was whether the agreement was binding on him. He had forfeited the 5 per cent. by not paying within the 42 days; but the plaintiffs were still willing to allow it to him.

No evidence was called on either side.

Mr. ELLIS addressed the Court at some length. He admitted that he signed the agreement, but submitted that it was not valid and binding on him because there was no consideration. The owner was not liable in the case of houses which were of a rateable value exceeding £20 a year, except under special arrangement; and therefore he was not liable for the rates in question, which referred to some 80 or 100 houses, unless the agreement was binding upon him. He was not responsible for anything antecedent to the date of the agreement, but was exempt from liability under the Act. Every house he was sued for exceeded £20 a year rateable value. The amounts he had paid into Court were for a house occupied by himself and for others supplied by meter. As to the latter, he entirely repudiated liability. The whole of them were let on short tenancies, and were determinable by short notices. The Company had found it very inconvenient to collect their rates from the tenants, and he had been in the habit of voluntarily paying the rates himself in one cheque from the time the houses were built eight or ten years ago. Very often, however, many of them were empty; and as this was a loss to him, he appealed to the Secretary of the Company to make an allowance. No concession was granted to him up to the year 1900, though he offered to assume all liability for the water-rates of his houses if he were allowed 15 per cent. discount whether the houses were occupied or not. Mr. Dickson refused, and argued that he was not bound to allow anything. His (defendant's) answer was that he need not pay at all, because in every agreement he had with his tenants he was exempt from paying rates and taxes. At the time of the agreement in question, he had a number of houses empty. He discussed terms, and ultimately Mr. Dickson said he would allow 5 per cent., though he (defendant) said it was quite inadequate to cover all contingencies and possible losses, and risks of the houses being occupied or not. The agreement was drawn up and signed; but he submitted that there was only a provisional consideration that if he paid the water-rates within 42 days he should receive the discount named. If he did not pay, then by effluxion of time the covenant and undertaking became null and void.

There was to be no consideration if he did not pay within 42 days; and his signature was nullified and neutralized by the lapse of the limit of time allowed. Why should he be compelled to pay water-rates which he had never received in respect of empty houses? He had about 40 houses vacant, owing to the discharge of workmen from the Royal Arsenal; and it was a serious matter for him, involving a loss of something like £1200 a year. He did not wish to escape from his just liabilities; but he asked the Court to shield him from the unjust claim now made upon him.

Justice JOYCE, in giving judgment, said in his opinion there was ample consideration for this very plain, precise, and specific agreement, which was binding upon the defendant. Mr. Ellis had argued that the agreement was rendered null and void by non-payment of the rates within the 42 days' limit. That, however, was an argument which was not intelligible to him; and the plaintiffs were therefore entitled to succeed. There must be judgment for them for the balance due (about £145), with costs.

Dealing in Spurious Mantles.

At the Birmingham Police Court, last Tuesday, W. F. Bradley, of Blackburn, a gas-mantle dealer, was charged by E. A. Wood, of Birmingham, with unlawfully applying a false trade description to 1000 incandescent gas-mantles purporting to be sold or issued by the New Sunlight Incandescent Company. Mr. Dorsett (who prosecuted) explained that the case came under the Merchandise Marks Act. Defendant seemed to have had in times past many business relations with the prosecutor, and to have been connected with the firm of Bradley and Co., of Blackburn. On Feb. 6, Mr. Wood, having heard that Bradley and Co. had some cheap Sunlight mantles, wrote and ordered 1000 at 2s. 9d. a dozen, and enclosed a cheque. There was no reply to the letter, but defendant sent a telegram to say that he was coming to Birmingham. He accordingly came, and produced a sample of the mantles ordered, stating that Bradley and Co. had ceased to carry on business. He stated that he had started on his own account, and asked that he should execute the order. The prosecutor said he was agreeable, if the goods were genuine. Defendant replied that they were genuine; and eventually the 1000 mantles were sold to the prosecutor, and the cheque was made payable to defendant. The goods arrived; and as the prosecutor suspected they were not genuine, he sent up a box to the Welsbach Company. They were then found to be spurious. Defendant had also been trying to dispose of other similar mantles. Mr. Baker, for the defence, urged that his client had been deceived. The mantles were bought from a firm in Amsterdam in exactly the same condition as they were sold to the prosecutor; and the defendant believed them to be genuine Sunlight mantles. The Bench imposed a fine of £20 and £5 costs; and the defendant also agreed to the forfeiture of the mantles, which he said cost him £60.

Attempted Suicide by Gas Poisoning.

At Bow Street Police Court last Wednesday, an American woman named Reta Fletcher, living at Keppel Street, Russell Square, was charged with attempting to commit suicide. Detective King stated that the previous evening he went to the house to make an inquiry as to some lost jewellery. In consequence of what he was told by the owners of the jewellery, who occupied an upper floor, he went downstairs to speak to the prisoner. He found the door of her room locked, and her husband outside trying to get in. They both listened, but could hear no sound from within the room. Being unable to force the door, he went outside and got into the room by the window, after breaking open the shutters, which were fastened. On entering, he found that the four burners of the chandelier were turned on, and that the room was full of gas. The prisoner was lying on her side on the floor in an insensible condition. She was, however, restored to consciousness. The prisoner said she had had a misunderstanding with her husband, and had afterwards turned the gas on; but she did not know her intentions at the time. She did it on the impulse of the moment, and was unable to stop the gas. A remand was ordered.

More Comparisons of Gas and Electric Lighting.—Mr. S. E. Halliwell, the Manager of the Littleborough Gas-Works, has been satisfying the desire of a correspondent of a local newspaper for information on the subject of the comparative cost of gas and electric lighting. Taking gas at the maximum Littleborough rate of 3s. 1d., and electricity at 3d. per unit, he brings out the cost of the two illuminants per hour of light equal to 1000 candles as follows: Low-power lighting by electric incandescent burner, 2s. 2d; by "C" incandescent gas-burner, 3d.; and by Kern do., 2¼d. High-power lighting by an electric arc lamp, 8d.; by incandescent gas, 1¼d. The "Rochdale Times," in which Mr. Halliwell's figures appeared, referring to the fact that the electricity scheme of the Littleborough District Council was bound to entail a large expenditure, earnestly commended them to the careful consideration of the Council.

Incandescent Gas Lighting in Battersea.—The Lighting Committee of the Battersea Borough Council reported, at last Wednesday's meeting, that the South Metropolitan Gas Company had offered to change the present flat-flame burners for incandescent ones on the following terms: (1) To convert the 1026 lamps in the Company's district at a cost of about £1 each; (2) to reduce the present annual charge for gas and maintenance from £3 3s. 9d. to £2 18s.; (3) to spread the cost of conversion over 3½ years, by continuing the present charge for the lamps for this period. The Committee pointed out that, even if the Council were prepared to spend £10,000 a year on extending the public electric lighting, at least twelve years would have to elapse before they could electrically light all the streets. They therefore recommended that the offer of the Company be accepted. This was agreed to. The terms offered by the Gaslight and Coke Company for their district are under consideration by the Committee.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND GAS TESTING.

The Question of Sunday Testing.

At the Meeting of the London County Council to-day, the Public Control Committee will present the following report.

The Council, on Oct. 7, 1902, authorized us to arrange for the gas supplied by the Gaslight and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company to be tested on Sundays and Bank Holidays, at the prescribed testing-places, for a period of six months, at a cost not exceeding £300. The South Metropolitan Gas Company, however, prevented the tests from being made at the testing-places in their district; and the Council authorized us to take all necessary legal steps to secure the testing of gas by the gas examiners at the prescribed testing-places on Sundays. Proceedings are now pending in the High Court against the South Metropolitan Gas Company. There have been three cases in which statutory deficiencies in the illuminating power of the gas have occurred on Sunday, and one case in which a distinct trace of sulphuretted hydrogen was reported; but the appeals lodged by the Gas Company have not been adjudicated upon by the Chief Gas Examiner, having regard to the proceedings in the High Court. We are of opinion that the tests of the gas supplied by the Gaslight and Coke Company and the Commercial Gas Company should be continued pending a decision in the action against the South Metropolitan Gas Company, but for not exceeding three months, at the end of which period we will report further. The estimated cost is £115; and we have provided for this expenditure in the estimates. We recommend: "That the Public Control Committee be authorized to arrange for the gas supplied by the Gaslight and Coke Company and the Commercial Gas Company to be tested on Sundays and Bank Holidays by relieving gas examiners at the prescribed testing-places, pending a decision in the action against the South Metropolitan Gas Company, or for a period not exceeding three months, at an estimated cost of £115.'

WELSBACH RECONSTRUCTION.

Our prophecy (says the writer of "City Notes" in the "Pall Mall Gazette") that the Welsbach reconstruction scheme would not be produced till about the time of the annual general meeting is evidently coming true. We learn, on what may be regarded as fairly reliable authority, that the report and accounts, made up to March 31, will be ready for issue about the end of April or beginning of May, and that the Directors' proposals with regard to the writing down of the capital will be produced at the same time. This is an operation that the shareholders had better make up their minds to face from a practical point of view, and be prepared to make such concessions as may be necessary. It is eminently desirable that the capital reduction should be thorough. Far better for the future of the Company that too much were written off than too little; but anything satisfactory can only be accomplished by the preference holders not standing out for their full pound of flesh. It is inevitable, of course, that the deferred shares will be drastically reduced; but the preference as well as the ordinary will have to make some sacrifice. In some respects the Welsbach position is unique. There can be no question that there has been a heavy loss of capital; and seeing that the principal basis of the Company's business is such a wasting investment as patents, there is no possibility of the capital being restored by an improvement in the value of the property. But the Company have prospects of a fine business in spite of past mistakes; and it can make substantial profits which, under good management, may continue independently of the patents. Unless, however, the shareholders consent to reconstruction, they must sit and watch these profits accumulating till the lost capital is replaced. That, of course, would interfere seriously with the progress and development of the business, because the Company's credit must suffer while no dividends are being paid; and, under these adverse conditions, it might take the best part of a generation before the shareholders could touch a penny of their profits. That cannot be a very cheerful prospect to took forward to, and, when they contemplate this aspect of the case, they will probably agree to sink their differences.

GERMAN CONTINENTAL GAS COMPANY.

Annual Report and Accounts.

We have received, through the courtesy of Herr W. von Oechelhaeuser, the General Manager of the German Continental Gas Company, a print of the annual report and statement of accounts which were submitted to the proprietors at the forty-eighth annual general meeting held on the 25th inst. As in past years, we give below an epitome of the items of more general interest in these documents.

The unfavourable industrial conditions which prevailed during the year 1902 have prevented the consumption of gas advancing so rapidly as in 1901 and a few immediately preceding years. The twelve districts which are supplied by the Company from eighteen gas-works showed on the average an increase in gas production of only 4·85 per cent., against an increase of 5·23 per cent. in 1901, and an average increase of 6·05 per cent. per annum during the past decade. The German works of the Company suffered most keenly; for Warsaw was responsible for an increase of 6·9 per cent. over its production for the preceding year. The industrial depression appeared to have reached

its lowest point in the first half of the year, as matters improved considerably in the second half. The net profit for the past year was only 2,862,576·98 marks (about £139,638), which is 252,997·71 marks (about £12,341) less than the net profit for the preceding year. This falling off in the profit is mainly attributable to the low price obtained for coke, of which a large stock remained in hand at the close of the mild winter of 1901-2. On the other hand, the price paid for coal was nearly the same as in the preceding year. After making a contribution of 900,000 marks to the renewal fund of the Company, a dividend is recommended at the rate of 10 per cent , against one of 12 per cent. for 1901.

The report states that the progress of the Company does not appear to have been checked by the competition of petroleum and electric lighting, notwithstanding the reduced consumption of current of the Nernst and osmium electric lamps. Among technical advances, the Company has turned its attention to the recovery of naphthalene and cyanogen from coal gas by means of its own patented processes; but, unfortunately, the cyanogen trade has during the past year been under a cloud.

The total production of gas for the year was 63,548,428 cubic metres (2,244,276,000 cubic feet), of which quantity 3·93 per cent. was unaccounted for. 74·09 per cent. of the production was used for lighting, and 21 98 per cent. for heating and power purposes. The gas sold through prepayment meters amounted to 3,643,674 cubic metres (128,680,000 cubic feet). The meters and fittings used in connection with prepayment supplies were made at the Company's workshop at Dessau. The growth of this branch of business, which was begun in 1897, has been remarkably rapid. The school of instruction established at Dessau for training fitters, in order to qualify them for holding positions as foremen and inspectors in the Company's service, has proved a success. The cost of maintaining this school and instructing twelve pupils there amounted to 7834 marks (£382).

The negotiations with the authorities of the town of M. Gladbach for the transfer of the Company's mains, meters, &c., to the Municipality at the expiration of the term of the existing concession—viz., on the 31st of December next, have been concluded. The Company retain their works in the town, and secure the right to maintain two trunk mains leading to outlying districts until the year 1941, when their concession for the supply of these districts expires. Furthermore, the Municipality has agreed to pay for the mains, &c., taken over a sum of 1,100,000 marks on the 2nd of January next, and 31,000 marks per annum for fifteen years; making a total, exclusive of interest, of 1,565,000 marks (£76,342). New contracts have been made for the supply of gas for a term of fifty years to a number of the suburbs of Potsdam.

The average consumption of gas per burner showed a very slight falling off as compared with the preceding year. The gas sold for power purposes amounted to 9·55 per cent. of the total make, and was consumed in 1098 motors, having an aggregate of 6488¾-horse power. The make of gas per ton of coal was 10,787 cubic feet, which was a somewhat higher yield than was obtained in 1901. On the other hand, the coke used in the retort furnaces rose from 16·87 to 17·47 per cent. of the weight of coal carbonized. The electricity works at Dessau belonging to the Company sold 11·3 per cent. more current than in the preceding year.

The report contains an appropriate obituary notice of the late Dr. Wilhelm Oechelhaeuser, who was for 33 years General Manager of the Company, and retired from that position in 1899 in favour of his son. His death, as already reported in the "JOURNAL," took place on the 25th of September last.

PARIS GAS SUPPLY.

Comparative Statistics of Consumption.

In the "JOURNAL" for the 3rd inst. (p. 563), we gave some tabulated statistics in regard to the gas supply of Paris since the year 1888. They were arranged in periods of two years until 1900, and then the latest figures obtainable (those for 1901) were added. Our contemporary the "Journal des Usines à Gaz" for the 20th inst. contains the particulars for 1902; and we give these to bring the statistics up to date. For comparison, those for 1892 and last year are reproduced:—

——	1892.	1901.	1902.
Total annual production of gas, in cubic metres	308,900,930	335,803,091	335,441,778
Loss by leakage, &c.	16,648,507	20,270,132	16,114,791
Total annual consumption . .	292,252,423	315,532,959	319,326,987
Gas used for public lighting—			
In Paris	46,044,043	40,706,001	36,841,933
In the environs	5,952,816	7,088,171	6,893,757
Gas used by private consumers—			
In Paris	222,765,419	245,376,606	252,696,350
In the environs	17,489,145	22,362,181	22,894,947
Number of private consumers—			
In Paris	228,565	438,994	454,651
In the environs	23,248	34,662	36,542
Average annual consumption per head, in cubic metres . .	975	559	555
Percentage of day gas included in the total production. . .	27·35	36·80	37·90
Do. used by each private consumer in Paris	32·60	44·40	45·30

It will be noticed that from 1892 to 1902 the total annual consumption rose by about 27 million cubic metres, though the number of consumers about doubled. The quantity of gas employed for lighting the streets of the city fell off by 9¼ million cubic metres; but the portion used by private consumers was something like 30 millions more. The suburban supply went up nearly a million cubic metres for public, and about 5½ millions for private purposes. Perhaps the most significant figures are those showing the percentages relating to day gas. This figured to the extent of 27·35 per cent. of the total production in 1892, while last year it was 37·90 per cent. Of the total quantity used by each private consumer, 32·60 per cent. was day gas ten years ago, and 45·30 per cent. in the twelve months lately closed. Another noteworthy feature is the loss by leakage. In 1892, it amounted to 16,648,507 cubic metres; two years later it was 19,294,833 cubic metres; while in 1900 it had risen to 23,670,312 cubic metres. Paris has been very much "up" of late, owing to underground railway works; and this doubtless accounts for these high figures. The drop to 20,270,132 cubic metres in 1901, followed by a further improvement last year (bringing the figures back to something less than those for 1892), shows that this matter is receiving careful attention.

PROFIT SHARING AT EXETER.

Last Thursday a meeting was held of the employees of Messrs. Willey and Co., of Exeter, for the purpose of distributing to the men their proportion of the past year's profits under the bonus scheme which has now been in operation at the works for two years. Mr. H. A. Willey was unfortunately prevented by illness from being present; but Mr. T. Glanfield, who presided, read a letter from him which clearly set forth the working of the scheme. The amount available for division was £1810; but as under the rules the men cannot receive in any one year more than 6 per cent. of their wages, this sum was £105 more than could be divided. Half the surplus is to go to a reserve fund to provide against a bad year; and the other half is to be carried to the sick fund. In the course of his letter, Mr. Willey asked the men to carefully consider what this profit-sharing really meant, so that it might continue. Profit-sharing, under their scheme, depended upon the strictest economy in everything, and truth and straight dealing between master and man. Each one should ask himself the question: "How much have I individually helped to bring about this result?" The agreement was that the scheme should be tried for three years; and they would remember that it was in no sense a part of their wages. The object was to bind up the interests of the men with the welfare of the firm, and to give them an opportunity of saving a bit of money without feeling to be in a measure independent, and able to some extent to meet trouble or illness if it should come. If, however, they drew the money out, they could not do this. The three years mentioned would be up in nine months, and this was all the time the men had left to prove that the profit-sharing was something more than a mere present to them, and that it was the right and best thing in the interests of the business. If it was found that the men had done their share to make the scheme a success, it would continue. Mr. Willey concluded his letter by saying: "I feel in this matter I have done my duty by you; and it will be your fault, and yours alone, if I am obliged by the keen competition and by the heavy rates and expenses to stop it. But if, on the other hand, it continues, nothing will give me greater pleasure. For the better administration of the business, and to encourage those whose heart is with us, I intend that the men shall elect an Advisory or Consultative Committee, one man and one manager in every department, to whom I may refer all general questions affecting their welfare, and to whose advice and assistance in a large business like ours I might reasonably look to promote the welfare of the concern. Again, if the profit-sharing scheme continues, I shall be willing to consider a scheme whereby the men may add to their share any savings which they might make; the business to pay them 5 per cent. interest for this too." Mr. Glanfield said he considered the letter was couched in the most friendly terms; but it was straight and full of meaning. They had cause for congratulation on the past year's working; but whether it was owing to the stimulus of the profit-sharing scheme, it was difficult to say. If he for one was asked point-blank to say what the men had to show for the £1810 that had been divided among them, he must confess he should be unable to answer whether the scheme was for the benefit of the place or not; but he did know that the profits of the past year would go a very long way towards building a new meter factory. There were other matters which cut into their profits besides the keen, and he might say fierce, competition and commercial wars they were daily brought face to face with. They should carefully watch the actions of, and take interest in, their local public bodies; and when their leader took up a position, they should to a man loyally support him. Why the local authorities, with the law in its present state, should want to take the lead in the taxation of machinery, he could not conceive, seeing their extreme position in the West of England. Surely it would be better policy for them to have patience, and profit by the experience of more prosperous districts.

Opposition to the Torquay Water Bill.—It was decided by the Newton Abbot Urban District Council at their last meeting to take the necessary steps to oppose the Bill which the Torquay Corporation are promoting for the extension of their water-works and the enlargement of their powers in the matter of water supply. Mr. T. W. Martin, who moved the resolution, expressed regret that the Corporation had not submitted the clauses affecting Newton Abbot to the Council for consideration, or at least suggested a conference on the subject. The Corporation appeared, however, to ignore Newton Abbot, while still endeavouring to extract huge profits from it. On Wednesday, the Newton Abbot Board of Guardians had under consideration a letter from the Town Clerk of Torquay, suggesting that if the Board's opposition to the Bill was withdrawn, and the assessment of the workhouse put on a fair and equitable basis, to be mutually agreed upon, the building might be exempted from the clause in the Bill by which public institutions are to be charged for water by meter. In the course of the discussion on this letter, some of the members contended that it was desirable to compromise the dispute if possible. The majority, however, were of opinion that it was undesirable to withdraw from the opposition at this stage; and a resolution was passed to the effect that it would be abandoned if the objectionable clause was withdrawn, but not otherwise.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. H. B. Chamberlain) read the notice convening the meeting, and also the report of the Directors for the six months ending Dec. 31, together with the accounts of the Norwich station as required by the Company's Act. The report was as follows :—

The available profit is £23,913, after deducting the following sums, and adding £644 from the Hull reserve fund; the parliamentary interest at that station not having been realized by that amount. The deductions (omitting shillings and pence) are as follows: Potteries excess profit, £1141; Trowbridge excess profit, £257; income-tax, £1125; Hull debenture interest, £2098; Norwich debenture interest, £890; Potteries debenture interest, £375; Trowbridge debenture interest, £164; interest on debenture stock, £1125—total, £7176.

HULL.—The gas-rental at this station shows an increase of £2619, as compared with that of the corresponding period of 1901; the price of gas having been the same at each period—viz., 2s. per 1000 cubic feet. Coke shows a decrease of £1836; tar and tar distilling, an increase of £400; and ammoniacal liquor and sulphate of ammonia, an increase of £669. Coals have cost 13s. 11d. per ton against 17s. per ton. Coke has realized 11s. 11d. as against 13s. per ton.

The gas sent out was 563,203,000 cubic feet, as against 548,815,518 cubic feet—an increase of 14,387,482 cubic feet, or equal to 2·62 per cent. Of this quantity, 48,877,000 cubic feet was sold in bulk to the Corporation for the supply of the old town.

The profit realized is £644 less than the parliamentary interest. This sum has been taken from the reserve fund, leaving a balance of £18,001 16s. 4d.

NORWICH.—The gas-rental at this station shows an increase of £762; the price of gas having been reduced from 3s. 6d. to 3s. 3d. per 1000 cubic feet from April 1, 1902. Coke shows an increase of £314; and tar and ammoniacal liquor, of £739. Coals have cost 17s. 10d. against 18s. 8d. per ton. Coke has realized 9s. 1d., as against 9s. 4d. per chaldron.

The gas sent out was 221,569,000 cubic feet, as against 199,515,000 cubic feet—an increase of 22,054,000 cubic feet, equal to 11·05 per cent.

The profit realized is £2966 less than the parliamentary interest.

POTTERIES.—The gas-rental at this station shows an increase of £223 over the corresponding period of 1901; the price of gas having been the same—viz., 2s. 8d. per 1000 cubic feet. Coke shows a decrease of £733; and tar, ammoniacal liquor, and sulphate an increase of £406. Coals have cost 12s. 5d., against 13s. 5d. per ton. Coke has realized 6s. 1d. against 7s. 2d. per ton.

The gas sent out was 193,993,000 cubic feet, as against 192,628,000 cubic feet—an increase of 1,365,000 cubic feet, equal to 0·70 per cent.

The profit realized is £1141 in excess of the parliamentary interest. This sum has been invested in Consols, making the reserve fund £19,831.

TROWBRIDGE.—The gas-rental at this station shows an increase of £167 over the corresponding period of 1901; the price of gas having been reduced on Jan. 1, 1902, from 3s. 6d. to 3s. 4d. per 1000 cubic feet, with discounts. The residual products realized £7 less. Coals have cost 15s. 9d., against 16s. 11d. per ton. Coke has realized 10s. 9d., against 13s. 7d. per ton.

The gas sent out was 32,699,000 cubic feet, as against 30,960,900 cubic feet—an increase of 1,738,100 cubic feet, or equal to 5·61 per cent.

The profit realized is £257 in excess of the parliamentary interest. This sum has been invested in Consols, making the reserve fund £896.

HOLYWELL.—The rental at this station shows a slight increase. The residual products realized £14 more. The profit is £307.

The available profit, added to the previous balance of profit and loss, amounts to £56,448. From this sum the Directors recommend a dividend at the rate of 10 per cent. per annum, clear of income-tax. This will amount to £23,000, and leave a balance of £33,448.

The CHAIRMAN said a short time since he saw in the "JOURNAL OF GAS LIGHTING" a remark with respect to the balance-sheet of a well-known Gas Company, to the effect that it was of that colourless character which generally belonged to a quietly progressive and prosperous Company; and he (the Chairman) ventured to think that their own balance-sheet might be included in that category. In fact, he might say that the half year had been a prosperous one for the Company, though not unduly so; and also an extraordinarily quiet half year—far too quiet for some of the more active members on his side of the table. However, there were features in the report and accounts which, he thought, were of interest to the proprietors at large. One of the prominent features of the half year was the maintenance of the very friendly relations with all the authorities in the towns lighted by the Company, and where their works were established. With reference to Norwich, he was induced to specially make a few remarks in consequence of the Bill the Company had in Parliament in connection with this station. He (the Chairman) told the shareholders at their previous meeting that the Norwich works would have to be remodelled and enlarged at a considerable expense, owing to, he was glad to say, the great increase in their business in the town. Not many years ago they were always at loggerheads with the Town Council; but, for a number of years past, it had been the effort of every member of the Board, and of their Engineer and officers at Norwich, to promote much more friendly relations with the people of the city. He was exceedingly glad to think they had succeeded in their endeavours, because when they introduced their Bill they expected to encounter some very strong opposition. However, the previous Monday week, Mr. Corbet Woodall, General Corrie, and himself had a conference with a deputation from the Town Council, who met the Directors named in a most friendly spirit. They agreed that the whole feeling in Norwich was altered for the better in regard to the Company; and the Board were able to come to reasonable arrangements with them, by which the petition against the Bill would now in all probability be withdrawn. He said "in all probability," because, although the petition had been withdrawn so far as the House of Lords were concerned, the Corporation reserved the right to oppose in the Commons, if it was thought fit to do so. But after the very friendly interview, and the concessions the Board were able to make, and which were received on the other side, he could hardly believe there would be any further serious opposition, so that it was reasonable to suppose the Bill would be passed. He need hardly say that this was most satisfactory to the Board; and he sincerely trusted it would be satisfactory not only to the shareholders, but to those gentlemen who represented the Corporation. With regard to the work that had been going on at Norwich, as he told the shareholders on the last occasion, they had been having plans and estimates for new works prepared. These were now being proceeded with; and as far as they could see, everything was in a satisfactory condition. The increase in the consumption of gas in Norwich had been abnormal—that was to say, abnormal in the sense that, during the past half year, nearly every gas company had been more or less affected with regard to the output of gas. As the shareholders were aware, it had been an exceptionally warm half year—they had not had one of those nice cold, dark winters which all gas companies looked forward to, and hoped for. But, notwithstanding this, they had obtained the extraordinary increase at Norwich of nearly 11 per cent. on the half year. This was exceedingly satisfactory from the Directors' and shareholders' point of view. He could not speak of a similar increase at any of the other stations. At Hull, the consumption had been very nearly stationary; and at the Potteries (where, he regretted to say, trade was in a very bad condition) there was also only a slight increase. But those gentlemen who were shareholders in other gas companies would have observed that the same tale had had to be told by nearly every chairman of old-established gas companies in old-established towns which had not got large and growing suburban districts to light. They had at the Potteries completed part of the works which were being erected on the new land close to the railway station. The retort-house roof was finished; and the Directors were now about to put in the retort-settings, so as to be able to light them up and get well prepared for next winter's work. With regard to Hull, it would be remembered that on the last occasion he commented on the deficiency in profits there; and a shareholder rightly asked a question with reference to the depletion of the reserve fund at that station, which, as he (the Chairman) then explained, was owing entirely to their not having raised the price of gas in the town when coal was dear. He also then ventured to predict that they would gradually reduce the *minus*, which stood on the corresponding period of 1901 at no less than £10,290, to something approaching the full profit. He was glad to say it was now brought down to £644 for the half year; and their Engineer at Hull, with whom they had a long interview the previous week, felt confident that, when the next half-year's accounts were laid before the shareholders, they would show a balance of profit to be added to the reserve fund again. He was sorry to say trade at Hull—he did not mean their own business particularly, but trade generally—was in a very unsatisfactory condition at the present moment. It was being realized now that the great competition from abroad, and the slackness of trade generally, was telling very much upon the great shipping ports like Hull. The consequence was the Company had not got that large increase which they had realized there in past half years. In every other respect, the business had gone on well at all the stations. He did not think there was any more to tell the shareholders with regard to the general position of affairs, which the Directors considered was very satisfactory. In conclusion, he moved the adoption of the report and accounts.

Mr. F. WILKIN seconded the motion, which was carried.

On the proposition of the CHAIRMAN, seconded by Colonel J. WILKINSON, a dividend at the rate of 20s. per share was declared, clear of income-tax, for the half year.

Moved by Mr. R. STEVENS, and seconded by Mr. A. BURNEY, a hearty vote of thanks was passed to the Chairman and Directors for their management of the business during the half year.

The CHAIRMAN made a brief response, and then proposed a similar compliment to the Secretary, the Engineers, and the other officers. He remarked that the Company were most ably served both in London and at every station; and from the Secretary and the Engineers downwards, everybody worked with hearty good will. He was glad to be able to report that their Engineer at the Potteries station (Mr. J. R. Heath), in whom the Board had complete confidence, and who had been ill for a long time, had at length been restored to health, and had returned to work. They hoped he would have a long life in the service of the Company. He was present that day; and he (the Chairman) was pleased to see him, and to welcome him on his restoration to health.

Mr. CORBET WOODALL seconded the motion, which was heartily agreed to.

The SECRETARY responded on behalf of himself and the officers generally, and the proceedings terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly general meeting to-day, they state that, after providing for all fixed charges, the six months' working has resulted in a profit of £46,038, out of which they recommend the payment of dividends at the rates of 10½ and 7½ per cent. per annum on the respective shares—the contingent and reserve funds having also been augmented to the extent of £3000 and £5000 respectively. They announce that the price of gas has been reduced 3d. per 1000 cubic feet as from the beginning of the present quarter. The accounts accompanying the report show that the revenue from the sale of gas in the six months amounted to £121,866, which was brought up to £139,941 by the addition of the ordinary and prepayment meter-rents. Residuals produced £23,586; and the total receipts were £164,029. The expenditure on the manufacture of gas came to £71,695, of which £52,147 was for coal, cannel, and oil; on distribution, to £19,009; and on management, to £4876—the total expenditure being £111,947, which left £52,082 to be taken to the profit and loss account. From this, however, there had to be deducted £6044 for interest on loan capital and commission, leaving a profit of £46,038, as already mentioned, to which had to be added a sum of £6497 brought from the previous half year. The quantity of gas produced from the 48,823 tons of coal, 1270 tons of cannel, and 1,144,319 gallons of oil used was 811,344,000 cubic feet, of which 737,764,000 cubic feet were accounted for, and 730,244,000 cubic feet sold.

A GAS EXPLOSION AT ARMLEY, LEEDS.

The accompanying photograph shows the effect of a terrible gas explosion that took place at Moorfield Road, Armley, Leeds, on Friday, the 20th inst. As will be seen, the whole front and a large part of the gable end of the house (No. 2, St. Ives Mount) were blown out, and the interior completely wrecked. The plaster ceilings of the lower front rooms of the two next houses were also more or less shaken down, and some fourteen or fifteen windows of houses on the opposite side of the street were broken. It is believed that the gas was ignited by the next door neighbour, who, under the impression that the escape proceeded from the fittings in his own house, was trying to locate it with a naked light. Fortunately, there was no one in the wrecked house at the time

of the explosion. The following day a careful examination of the section of pipe crossing the end of the street was made in the presence of Mr. R. H. Townsley (the General Manager of the Corporation Gas Department), Mr. T. A. Prince (the Surveyor of Highways), and Mr. Walter Hole (the Superintendent of the Gas Mains and Distribution Department). It was found that the main had been considerably depressed and fractured, evidently by some heavy weight passing over it. It was then discovered that the road-roller belonging to the Highways Department had passed over the ground several times on the previous day, and was the cause of the accident. The broken main was of 2 inches diameter, and was laid in 1896.

THE MAIDSTONE GAS EXPLOSION.

A Meeting of the Maidstone Urban District Council was held last Tuesday week, to receive the report of the Council in committee (*ante*, p. 718) recommending the acceptance of the Gas Company's offer to pay £500 in full satisfaction of the claim against them in respect of the damage done to the bridge by the explosion which occurred last November. Mr. Vaughan said that, although the sum named might be sufficient to put the bridge in repair, there was the question of the payment of their own Engineer and staff for the time they had given to the matter. He therefore moved as an amendment that the offer of £500 should be accepted providing the Company paid the Engineer's charge of £70 and the Corporation's out-of-pocket expenses. Mr. Styles seconded; remarking that the Company had the right to supply the town through certain channels; and had they confined themselves to these channels, there could have been no explosion. He knew nothing about "contributory causes;" but he could not help thinking that a Company, who had grown rich should in their magnanimity—if for no other reason—be prepared to meet the ratepayers. The Mayor (Alderman W. Day) said that, in the consultation between the Town Clerk, himself, and the Chairman of the Company, everything possible was urged; but the amount stated was the utmost they could get the Company to agree to pay. At this point, an unseemly squabble arose with regard to the voting on the question by members who held shares in the Company; one gentleman contending that there was a good deal of doubt as to whether the majority vote of the Council in committee was not made up by the votes of shareholders. This, however, was emphatically denied by those concerned. When calm had been restored, Mr. Morling pointed out that the Company had never denied liability, but they had asserted that there was contributory negligence on the part of the Corporation. All the ratepayers who had spoken to him said they thought the Council very wise to settle the matter on the terms mentioned. Mr. Vaughan replied that the fact of the Company compensating the injured persons showed they felt their responsibility. Upon a division, the amendment was carried by a majority of one. The point afterwards arose as to what should be done with regard to the cavity under the bridge; and it was decided to write to the Company asking if they wished the cavity filled in, and, if so, whether they would pay the cost.

MR. SHADBOLT ON THE VALUE OF COAL GAS.

As briefly mentioned in the "JOURNAL" last week, a feature of the exhibition of gas appliances held in the Exchange Hall, Grantham, under the auspices of the Grantham Gas Company, in the week ending the 21st inst., was an interesting and instructive lecture by Mr. R. G. SHADBOLT, their Engineer and Secretary, on "The Value of Coal Gas for Lighting, Heating, and Power." The Chairman of the Company (Mr. J. G. Thompson) presided, and introduced the subject in a singularly appropriate address, and then left the lecturer to tell his story.

Mr. Shadbolt began by saying he thought that if there was one thing which they, as ordinary people in the world, were apt to do more than another, it was to appreciate least those things with which they were most closely connected or acquainted in their everyday life. Familiarity, if it did not breed contempt, did, at any rate, engender an under-estimation of that which one had in close perspective. This applied to gas matters as well as to others. The majority of gas consumers had, more or less, what he might call a hazy notion of the value of that commodity to them; and he ventured to think that few, if any, would care to try to express that value in ordinary terms of exchange. Hence his humble attempt would be to place those values before them in terms of ordinary currency and comparison. He then passed on to explain the meaning of the term "candle power," and stated that the gas supplied in Grantham was of 17½-candle power when consumed in a particular burner, prescribed by the Board of Trade, at the rate of 5 cubic feet per hour. But the lighting duty of the ordinary burner was not quite equal to that developed by the prescribed burner. The regenerative burner would give better results. He put the duty of the three burners as follows: Flat-flame burner, 3 candles per cubic foot; argand burner, 3½ candles; and regenerative burner, 9 candles.

On a previous occasion, when discussing the subject of lighting, he had taken nothing more than the standard candle, and these three kinds of burners. They now were invaded by another form of illuminant—the electric light—which, at one fell swoop, would utterly annihilate existing systems; and at the same time redeem mankind from that terrible fate which had, all unknown to them, been impending during the last century or more—he meant the extinction of the species by asphyxiation by coal gas. A statement which had been most sedulously circulated in their midst in regard to the electric light was very misleading. It was to the effect that electricity at 5d. per unit was equal to gas at 2s. 11d. per 1000 cubic feet. Let them subject this assertion to the foot duty test, and see how far it was true. In the pamphlets that had been circulated, they were informed that one unit of electricity would provide light in an 8-candle lamp for 30 hours. If they examined this statement, they found that 8 candles multiplied by 30 hours equalled 240 candles. In other words, one unit of electricity would give a light of 240 candles for an hour. Very well; 2s. 11d. was 35d.; 35 divided by 5d.—the price of electricity—equalled seven times. So that, according to their claim, there was the equivalent in 1000 cubic feet of gas of seven units of electricity. If this were true, and they divided the 1000 feet of gas by 7, they got 142·85 cubic feet as the equivalent of one unit of electricity. Without wearying them with further calculations, this clearly showed that they should be getting 1·68 candles per foot of gas consumed, whereas they knew they were getting at the least, with the smallest duty burner, 3 candles per foot. Continuing their experiments with the three burners already referred to, let them go a little farther on the same lines, and see what quantity of gas was equal to a unit of electricity. In the flat-flame burner, 80 cubic feet of gas equalled one unit. If they found how many 80 cubic feet there were in 1000 cubic feet, and multiplied the result by 5d., they would get 5s. 5d. instead of 2s. 11d. The argand burner gave a light of 3½ candles per foot, and they found that 68½ cubic feet would produce the requisite 240 candles, which equalled one unit of electricity. Treating these figures in the same way, the value of gas ran out at 6s. 9½d. When they came to the regenerative lamp, in which the lighting duty was three times greater, they found that the consumption of gas was only 26½ cubic feet to equal one unit, which enhanced the value of gas to 15s. 8d. instead of 2s. 11d.

The lecturer went on to say that, so far, they had dealt with the light obtained from the properties inherent in the gas itself—that was to say, those flames in which the luminosity was derived from what was known as the dissociation of gases, liberating carbon atoms in a finely divided state, and raising them, by means of heat, to a state of incandescence. He then explained the chemical process of combustion, and proceeded to make several interesting and instructive experiments, showing the increased luminosity caused by the admixture, by pressure, of atmospheric air with the gas consumed in the ordinary bunsen burner. It was this admixture of air with the gas that had such a striking effect in the incandescent gas-burner, though in this instance the air was not introduced by pressure, but admitted by a simple but ingenious arrangement in the burner itself. [All this was illustrated by actual demonstration by Mr. Shadbolt.] By regulating the quantity of air, they were able to raise or lower the amount of incandescence obtainable from a cubic foot of gas, so that they could get anything from 3 up to about 40 candles per cubic foot.

Summarizing the figures he had brought forward, Mr. Shadbolt showed that the ordinary incandescent burner gave a light equal to 15 candles per cubic foot of gas consumed per hour; a better type gave a light equivalent to 20 candles; and the Kern burner one equal to 25 candles. If they came to the various forms of intensified lighting—and their names were legion—they obtained any result from 30 to 40

candles, and in some cases even more per cubic foot of gas. But let them take the average of intensified lighting at 35 candles to the foot. [Mr. Shadbolt mentioned incidentally that some short time ago he had occasion to look into the question of intensified gas lighting, and he conceived the idea of reversing the usual order of things in the burners. He thought that if he were to put the air under pressure, and draw in a very small proportion of gas, he might get a better result. As a matter of fact, he obtained a light of 37·69 candles per cubic foot per hour. Professor Lewes considered this experiment sufficiently noteworthy to be mentioned in the course of his Cantor Lectures before the Society of Arts in December last.*] It was reasonable, however, to expect that before long not only 35 or 40, but even 50 candle power would be obtained from every cubic foot of gas consumed. If they took these figures as they did the others, and reduced them to the 5d. per unit equivalent, they found the result came out thus: From the ordinary incandescent burner, 16 cubic feet of gas equalled one unit of electricity. When they found how many times 16 would go into 1000, and multiplied the result by 5, they arrived at the fact that the value of gas was raised to 26s. instead of 2s. 11d. In a good incandescent burner, 12 cubic feet of gas produced a light of 240 candles, or the equivalent of one unit of electricity, and increased the gas value to 34s. 8½d.; while in the best-known form (the Kern), only 9·6 cubic feet of gas were required to produce the equivalent of the unit, still further increasing the value of gas to 43s. 4d. Then they came to the intensified system. He could imagine his electrical brother putting his hand on his shoulder, and saying "Stop; you forget we have got the arc lamp." But he had not forgotten it. They would put the intensified systems against the arc lamp, which they were reminded week by week, by the advertisements in the local papers, was "the cheapest light in the world." They would endeavour to ascertain whether or not this was so. In the very booklet from which he had been quoting, they were told that the arc lamp only required half-a-unit of electricity per hour to maintain a light equal to 1000 candles. He would examine that statement. The intensified system of incandescent gas lighting averaged 35 candles per cubic foot; the unit represented a light of 2000-candle power per hour for 5d. If they took 2000-candle power and divided it by 35—the lighting duty of intensified gas—they got 57·14, which represented the number of feet which, in the intensified burner, gave a light equal to one unit of electricity in the arc lamp. In other words, they had the result that instead of being 2s. 11d. against the so-called "cheapest light in the world," the gas value was 7s. 3½d.!

The lecturer went on to say that up to this stage he thought he had shown his audience sufficient to demonstrate the incorrectness of the notion that had somehow got abroad, that the days of gas lighting were numbered, and that it must be relegated to the kitchen and the firegrate. It was an entirely mistaken idea. On the contrary, the increase in the lighting duty of gas during the last ten or fifteen years from the 9 candles of the regenerative lamp to the 35 or 40—they had hopes of even 50—candles of the intensified system, was greater than the rate of progress of any other form of illuminant in existence.

Now they came to what they might term the collateral advantages which were claimed for the new illuminant. Many of them were of so hypothetical a nature as not to call for serious notice. But one was altogether too ridiculous to go unchallenged. It was claimed that by using electricity for lighting houses or shops and premises they obtained a pure atmosphere. Nothing could be farther from the truth. If that room were lighted by electricity, they would very soon find they were having a headache, because the products of respiration, and other organic emanations, would tend to stratify in the lower part, unless they were carried off by mechanical means. Gas not only removed its own products, but those of our bodies, and caused fresh air to flow in to replace them. It also acted as a bacterial crematorium. [Mr. Shadbolt quoted, in illustration of his remarks on this point, the series of experiments carried out by Professor Percy F. Frankland, F.R.S., at the Birmingham Art Gallery.*]

Mr. Shadbolt next proceeded to the subject of the heating power of coal gas. He said this was a field which gas had made peculiarly its own, and there was no need for him to point out its advantages in cooking in face of the hundreds (nay thousands) of Grantham people whose daily food was prepared by this means. In this connection, their electrical friends had exercised a becoming modesty. He had looked through all kinds of electrical literature, and looked in vain, for any clue as to the amount of electrical energy required to provide a certain amount of heat. Accordingly, he had caused experiments to be made, to ascertain the heating power of electricity. It required half-a-unit of electricity to boil one gallon of water, at a cost of 1¾d. (current being offered for heat and power at the rate of 2½d. per unit); but 5 cubic feet of gas accomplished exactly the same thing at a cost of 0·195d. Accordingly, the value of gas, compared with electricity, was 20s. 10d. per 1000 feet; or, in other words, instead of gas being worth 2s. 11d., it was worth 20s. 10d. On the question of motive power, Mr. Shadbolt showed that gas was infinitely cheaper than electric current. Their Electric Supply Company credited themselves with consuming one unit per brake horse power per hour in their smaller motors, at a cost of 2½d.; whereas 20 cubic feet of gas would do the same work for 0·78d., which made the comparative value of gas 10s. 5d. per 1000 cubic feet. The following would give the summary of gas values per 1000 cubic feet against electricity at 5d. and 2½d. per unit:—

	5s. 5d.	2s. 11d.
Flat-flame burner	6	9½
Argand ,,	15	8
Regenerative ,,	26	0
Ordinary incandescent burner	34	8½
Good ,, ,,	43	4
Best ,, ,,	7	3½
Intensified ,, ,,	20	10
Heating	10	5
Power		

* See "JOURNAL," Vol. LXXX., p. 1620.

* See "JOURNAL," Vol. LXXX., p. 276.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 818.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
200,000	5	Nov. 13	6½	Bombay, Ltd.	5⅝—6⅛	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅝	..	5 9 5
380,000	Stk.	Feb. 26	12	Brentford Consolidated	242—247	..	4 17 2
286,700	,,	,,	9	Do. New	177—182	..	4 18 11
50,000	,,	,,	5	Do. 5 p.c. Pref.	131—136	−2	3 13 6
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	110—113	..	3 10 10
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	207—212*	..	5 1 5
246,320	,,	,,	7½	Do. A. Ord. Stk.	151—155*	..	5 0 0
460,000	20	Sept. 26	10	British	39½—40½	..	4 18 9
100,000	Stk.	Mar. 12	6	Bromley, 5 p.c. "A"	118—123*	..	4 17 7
165,700	,,	,,	4½	Do. 3½ p.c. "B"	90—95*	..	4 14 9
500,000	10	Oct 15	7	Buenos Ayres (New) Ltd.	10½—11	..	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	52—94	..	4 5 1
150,000	20	Mar. 12	8½	Cagliari, Ltd.	23—25*	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
1,375,000	Stk.	Feb. 26	5	Commercial 4 p.c. Stk.	105—108	..	4 12 7
503,750	,,	,,	4½	Do. 3½ p.c. ,,	99—102	..	4 13 2
407,817	,,	—	3	Do. 3 p.c. Deb ,,	89—92	−1	3 5 3
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	115—125	..	6 8 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
575,000	Stk.	Feb. 26	5⅞	Crystal Palace Ord. 5 p.c.	115—120	..	4 8 10
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
106,158	,,	Jan. 15	5	Do. 5 p.c. Deb. Stk.	137—140	..	3 11 5
486,090	10	Jan. 29	10½	European, Ltd.	18—19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Feb. 12	4⅛	Gas- 4 p.c. Ord.	80—82	−1	5 7 4
2,600,000	,,	,,	3⅛	light 3⅛ p.c. max.	86—83	+1	3 19 7
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	103—106	−2	3 15 6
4,193,975	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	89—91	−1	3 5 11
232,500	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	90—95*	..	5 5 3
70,000	10	Oct. 30	8	Hongkong & China, Ltd.	15—16	..	5 0 0
3,800,000	Stk.	Nov. 13	10	Imperial Continental	204—207	..	4 16 7
473,600	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	100—103	..	3 8 0
165,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	115—120*	..	5 0 0
561,000	Stk.	Feb. 26	10	Liverpool United A	219—221	..	4 10 6
718,100	,,	,,	7	Do. do. B	161⅛—163½	..	4 5 8
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.	113—115	−1	3 9 7
75,000	5	Dec. 11	5	Malta & Medn., Ltd.	4⅛—5	..	5 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	105—109	..	4 11 9
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd.	9⅝—10⅛	..	6 13 4
1,515,892	Stk.	Feb. 20	4½	Newc'tle & G'tesh d Con.	103⅛—104⅜	..	4 6 2
376,855	Stk.	Jan. 2	3½	Do. 3½ p.c. Deb.	97—98	..	3 11 5
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	143—148	..	5 8 1
600,000	5	Sept. 26	7	Ottoman, Ltd.	6—7	..	5 0 0
				* Ex. div.			

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6½	Ply'mth & St'house 5 p.c	127—13	..	4 12 9
851,070	10	Oct. 15	7	River Plate Ord.	10¾—11	..	6 4 5
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 26	8	San Paulo, Ltd.	12—13	..	6 3 1
135,000	Stk.	Mar. 12	10	Sheffield A	234—23[illegible]*	+1	4 4 9
209,984	,,	,,	10	Do. B	234—236*	+1	4 4 9
523,498	,,	,,	10	Do. C	234—236*	+1	4 4 9
103,235	Stk.	Sept. 26	5	Shrewsbury Ord. 5 p.c.	113—116	..	4 6 2
6,000,000	Stk.	Feb. 12	5⅛	South Met., 4 p.c. Ord.	117—120	..	4 8 10
1,780,000	,,	Jan. 15	3	Do. 3 p.c. Deb.	91—93	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord.	103—107	..	4 13 6
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Feb. 26	6	Tottenham and Edmonton A. 5 p.c. B. 3½ p.c.	115—120	..	5 0 0
300,520	,,	,,	4½		93—96	..	4 13 9
182,380	10	Dec. 30	8	Tuscan, Ltd.	8½—9¾	..	8 6
149,000	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94—96	..	5 4 2
730,872	Stk.	Mar. 12	5	West Ham, 5 p.c. Ord.	95—100*	..	5 0 0
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11⅓	Chelsea, Ord.	315—325	..	3 10 9
150,000	50	,,	5	Do. 5 p.c. Pref.	150—155	..	3 4 6
160,000	,,	,,	4⅔	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Sept. 26	4⅔	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Oct. 15	8	East London, Ord.	230—235	+2	3 8 2
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	97—99	..	3 0 7
700,000	50	Dec. 11	8	Grand 10 p.c. max.	117—122	..	3 5 7
310,000	Stk.	Sept. 26	4	Junction 4 p.c. Deb.	125—130	..	3 1 7
708,000	Stk.	Feb. 26	10½	Kent	292—300	−5	3 10 0
160,000	,,	,,	7	Do. New, 7 p.c. max.	195—205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	300—310	−5	3 11 0
406,200	100	,,	8⅔	Do. 7⅔ p.c. max.	220—230	..	3 13 11
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Feb. 12	12½	New River, New Shares	390—400	..	3 4 0
1,000,000	Stk.	Jan. 29	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	Dec. 11	7	South-wark and Ord. 7⅔ p.c. max. 5 p.c. Pref.	202—207	+2	3 7 8
126 500	100	,,	7		190—200	..	3 10 0
489,200	Stk.	,,	5		151—154	..	3 4 11
1,019,585	,,	Oct. 15	4	Vauxhall 4 p.c. A Deb.	123—128	..	3 2 6
1,155,066	Stk.	Dec. 11	10	West Middlesex	290—300	..	3 6 8
200,000	,,	,,	4⅔	Do. 4⅔ p.c. Deb.	140—145	..	3 2 1
200,000	,,	Mar. 12	3	Do. 3 p.c. Deb.	95—97*	..	3 1 10
				* Ex. div.			

This gave an average of 18s. 11d., or 6·48 times the value attributed by the electrical critics. Gas at 18s. 11d. per 1000 cubic feet equalled 45·4 units, at 22 cubic feet per unit. If they took the last Board of Trade returns relating to authorized gas undertakings, and analyzed them, they would find that for every £1000 invested in gas, the consuming part of the public had in return 1,321,000 feet of gas at its disposal. Now, £1000 of electrical capital should yield 59,973 units, whereas it only produced 7158 units, or one-eighth of that which was provided by gas.

In conclusion, Mr. Shadbolt thanked his audience for the attention they had given to him, and expressed the hope that his efforts would enable them to arrive at a truer conception of the value of that medium of light, heat, and power with which they had long been acquainted—viz., gas—and that, at any rate, some might be assisted in arriving at a right conclusion, without the necessity of undergoing the painful operation known as burning of the fingers.

ELECTRIC LIGHTING NOTES.

Marylebone's Electric Lighting Award.

At the meeting of the London County Council last Tuesday, the Finance Committee submitted for approval the estimates for the Money Bill of the present year. The amounts for which it is proposed that borrowing powers shall be applied are: For the Council's own purposes, £8,120,090 for the year and £3,884,250 for the following six months; and for loans to public bodies, £4,749,000 and £1,777,500. The Committee included in the loans to local authorities the sum of £1,441,000 for loans to the Marylebone Borough Council for the purchase of the electric light undertaking from the Metropolitan Electric Supply Company. They stated that this provision had been made without prejudice, as the Committee and the Council had not considered the application of the Borough Council. Some discussion having arisen on this item, Lord Welby said the Finance Committee had to decide whether they would ask the Council to make provision for this loan in the event of the Council's deciding to lend the money; and they came to the conclusion that the Council would at any rate wish to be in the legal position to make the loan. The estimates were approved. After several hours discussion, the Marylebone Borough Council on Thursday night constituted an Electric Supply Committee, and defined their duties and powers in relation to conducting the local electric service when it passes into the hands of the Council under the terms of the recent arbitration award. Further, they agreed to engage the services of Mr. A. Wright as Commercial Adviser and Managing Consulting Electrical Engineer.

The Lichfield Corporation and their Order.

When referring to the above matter in the "JOURNAL" for the 17th inst., we mentioned that a deputation from the Corporation of Lichfield was to wait on the Board of Trade in regard to obtaining some concession from the Board in the matter of time for carrying out their Electric Lighting Order. The deputation accordingly had an interview with the officials of the Board, and laid before them all the facts. They were informed that the Board would not think of revoking the Order until due notice had been given to the Corporation. They would probably send a letter of inquiry next October as to why the works under the Order had not been carried out; and then would be the time to urge the Board to grant an extension. There was another question, as to enlarging the area so as to include that of the Gas Company; but the deputation were informed that this could not be done under the existing Order, but only under a new one, for which notices would have to be sent to the proper authorities before the 1st of July. When the result was reported to the City Council, reference was made by Mr. Coleridge-Roberts to the fact that, when the deputation was appointed, he objected to the Town Clerk (Mr. Herbert Russell) being a member of it, and explained that his reason for doing so was not a personal one, but was founded upon a principle which he still held. The Town Clerk was a Director of the Gas Company, and therefore he considered he was not qualified to join in such a deputation. Mr. Russell had, however, acted in a most honourable and upright manner, and did not do more for gas than he did for electric lighting. The Town Clerk expressed his thanks to Mr. Coleridge-Roberts for this frank acknowledgment of his services. The outcome of the affair appears to be that the electric lighting question will be allowed to rest for a time.

KIDDERMINSTER WATER SUPPLY.

Local Government Board Inquiry.

The Kidderminster Corporation having applied to the Local Government Board for power to borrow £18,000 for an additional water supply, the matter was recently inquired into by Mr. A. A. G. Malet, one of the Board's Inspectors. Mr. Vachell gave details as to the present water supply to the town, and explained the reasons for desiring to increase it. Mr. J. E. Willcox followed with some engineering particulars of the scheme for the carrying out of which the loan was asked. The Borough Surveyor (Mr. A. James) said there was great difficulty in keeping up the supply in 1900, and the water was shut down six nights that year, seven the next year, and 22 in 1902. Once there was only 3½ inches of water in the reservoir; and some manufacturers allowed the Corporation to have water from their artesian wells. Mr. W. Whitaker, F.R.S., said the sandstone beds, from which the water was obtained, were some of the best water-bearing strata in the kingdom. With adequate machinery, he did not think there would be any difficulty in obtaining a full supply for the town. The Medical Officer of Health (Mr. D. Corbet) gave evidence as to the general health of the

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town being favourable since the epidemic of 1884. The supply worked out to 37 gallons per head. Dr. J. L. Stretton opposed the scheme on the ground that the site of the new well rendered the water liable to contamination. It was within a few yards of the lower well, with which Dr. Parsons, the present Assistant Medical Officer of the Local Government Board, was dissatisfied in 1884. Dr. Hodgson Moore thought there was no objection but a sentimental one to the site of the new well. He considered the water perfect. Mr. E. Tanner gave detailed evidence in opposition to the scheme. He endeavoured to prove that the yield of water from the existing wells was more than had been stated, and that the plant and machinery were sufficient for all their needs. He said great waste was going on. Mr. H. E. Purkis, formerly a member of the Corporation, contended that there was plenty of water and of pumping power at the present time. If, however, any large sum was to be spent, he urged that it should be used for a site where there was no suspicion of contamination. They not only had enough water for their own needs and for Stourport, &c., but they had actually sold some to a private company. Mr. Young (who appeared on behalf of the opponents to the scheme) submitted that there was immense waste of water, and that, despite this, there was plenty available for the public use. If there was any real ground for the scheme, there would not be such determined opposition to it, and there would be a majority of more than two in the Town Council in its favour. At the close of the inquiry, the Inspector visited the site of the well.

EFFECT OF WATER-METERS ON CONSUMPTION.

A few weeks ago, a national convention was held in New York City, under the auspices of the Reform Club, to discuss various topics relating to municipal ownership and public franchises. From a paper, entitled "City Ownership of Water Supply—a Successful Contest for Good Water," presented at one of the meetings by Mr. W. R. Hill, Chief Engineer of the Aqueduct Commission of New York City, the following statistical paragraphs relating to the use of water-meters have been extracted by the "Engineering Record."

In 100 cities in the United States, having an aggregate population of 11,000,000, the average consumption of water per day is 1457 million gallons, equivalent to 132½ gallons per day for each person. In these cities there are 1,531,500 taps or service-pipes and 283,554 meters in use; hence 18½ per cent. of the service-pipes are metered. In order to show the effect of the use of meters on the quantity of water consumed per person per day, the 100 cities have been divided into five classes. In Class A there are 41 cities, of an aggregate population of 6,150,000, having less than 10 per cent. of their services metered. Their average consumption of water per head per day is 162 gallons, and their total consumption per day is 996,400,000 gallons. The total number of services is 930,000, and the number of meters, 31,000; 3·33 per cent. of the services being metered. In Class B are 20 cities, of an aggregate population of 1,461,000, having from 10 to 30 per cent. of their services metered. Their average consumption of water per head per day is 127 gallons, and their total consumption per day 185 million gallons. The total number of services is 190,067, and the number of meters 22,502; 11·8 per cent. of the services being metered. In Class C are 18 cities, of an aggregate population of 1,759,000, having from 30 to 50 per cent. of their services metered. Their average consumption of water per head per day is 96 gallons, and their total consumption of water per day is 168,000,000 gallons. The total number of services is 220,714, and the number of meters 78,700; 35·6 per cent. of the services being metered. In Class D are nine cities, of an aggregate population of 768,000, having from 50 to 75 per cent. of their services metered. Their average consumption of water per head per day is 75 gallons, and their total consumption of water per day is 57,600,000 gallons. The total number of services is 110,119, and the number of meters 68,352; 68 per cent. of the services being metered. In Class E are 12 cities, of an aggregate population of 862,000, having from 75 to 100 per cent. of their services metered. Their average consumption of water per head per day is 58 gallons, and their total consumption of water per day is 50 million gallons. The total number of services is 90,600, and the number of meters 83,000; 91·6 per cent. of the services being metered.

Of the above-mentioned cities, 90 procure their supply of water by pumping, the cost of which is one of the principal items of expense In Allegheny (Pa.), where they have scarcely any meters in use, the consumption per head per day is 300 gallons; while in Brockton (Mass.), where 83 per cent. of the services are metered, it is only 30 gallons. Thus it is apparent that the effect of the use of meters is to greatly reduce the consumption of water, or, more properly, the waste of water. In a report of the Bureau of Water of Buffalo, it is stated that on Feb. 10, 1899, when a zero wave prevailed, the quantity of water delivered per head was 440 gallons. A large portion of this was evidently allowed to run to waste, to prevent it from freezing in the pipes. It might be interesting to note that their entire supply of water is obtained by pumping, and that no record was presented of the bulk of coal consumed at the station on that cold day. About 2 per cent. of their services are metered; and their average consumption of water per head per day is about 265 gallons.

Torquay Corporation Gas and Water Works.—An inquiry was held at Torquay on Friday respecting an application by the Corporation for the sanction of the Local Government Board to loans of £5000 for the extension of the St. Mary Church Gas-Works and £2144 for water-works. It was stated with regard to the former (which the Corporation hold in trust for the benefit of the district of St. Mary Church) that the original debt was £14,208, and that the redemption and surety fund amounts to £2516; leaving a net debt of £11,692. The present loans are required chiefly for mains.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Another endeavour to utilize peat for commercial purposes—of which there have been many, and all of them hitherto, I suppose I may say without fear of contradiction, failures—is being made at the Lochar Moss, about three miles to the south of Dumfries. A Company have leased 300 acres of moss land, upon which there is a depth of peat of at least 16 feet, and in most parts more, so that there is an abundant supply for many years, supposing the industry to go on. Steam-driven machinery has been fitted up, which conveys, elevates, and pulverizes the peat, and then presses it into bricks; the whole process being done without handling. A great quantity of moisture is driven off; but the bricks require to be further dried, either in the open air or in sheds. When dry, they are as hard as dried oak. It is announced —I presume upon the authority of the Company—that peat is an excellent building material for the production of briquettes, in combination with powdered coke or coal; and that peat charcoal is coming largely into favour for metal smelting. But, it is added, "probably the greatest field of enterprise is to be found in the manufacture of power gas and the generating of electricity by its means. A ton of peat, it has been ascertained, will produce 13,000 cubic feet of lighting and heating gas; of power gas the yield would be a good deal more; and the residual products have a commercial value which materially lessens the cost. These are of a varied nature. From each ton of peat are extracted 16 lbs. of acetic acid, 46 lbs. of wood naphtha, 20 lbs. of sulphate of ammonia, 12 lbs. of paraffin wax, and a quantity of tar." Whence all this has been obtained is not set forth. The reliability of the statement, therefore, must be left an open question in the meantime. It may, however, be of interest to recall that in 1893 the late Mr. F. T. C. Linton, of Leith, reporting to the Edinburgh and Leith Gas Commissioners upon experiments he made in carbonizing peat, stated that he obtained from one sample of peat 2116 cubic feet of gas per ton, of an illuminating power of 1·28 candles; from another sample, 5404 cubic feet of gas, of 2·26 candles; and from a third sample, 9791 cubic feet of gas, of 9·69 candles. The coke in the three samples was 378 lbs., 1372 lbs., and 812 lbs. respectively; and the tar, 5¼, 7, and 10½ gallons. The ammoniacal liquor was too weak to be of any marketable value. He also found that there was an excessive proportion of carbon dioxide, which would make the cost of purification enormous. Of course, there may have been, and in all probability there have been, improvements in the methods of producing gas from peat during the past ten years; so that the absence of fuller information need not lead us to look upon the statement as to the results obtained at Lochar as exaggerated. But, at the same time, detailed information would be welcome, as there is much peat in the land which, if it could only be used profitably in industrial processes, would result in a distinct national gain; and, in addition, there are many out-of-the-way places where the use of peat gas might be feasible and extremely beneficial.

In Aberdeen, the Corporation Electricity Department is managed by the same Committee as is the Gas Department. The Corporation having just completed the erection and equipment of a large electric station, a visit to it was paid at the end of last week by the members of the Town Council, prominent citizens, and officials. The total outlay upon the station has been over £90,000. After seeing over the works, light refreshments were served, and several toasts were proposed. Lord Provost Walker proposed the Committee; and, in doing so, said it was 33 years since the Corporation took over the gas-works. Though they paid a pretty stiff price, it had been a good undertaking for the town; and he was sure the Town Council of the time did the right thing in acquiring the undertaking. Mr. Kemp, Convener of the Committee, in response, said that they had just now 1075 customers for electricity; and, in addition, there were 618 public and private arc lamps. Bailie Esslemont, in proposing the officials, said he was extremely sorry—and he was sure they all were—that they should miss that afternoon the genial presence of their friend Mr. Smith. They were all aware that when they took over the gas undertaking they took over Mr. Smith with it, and that he had proved one of the most efficient, zealous, and painstaking officials the Corporation of Aberdeen had ever had. He was sure they joined with him in expressing the hope that the indisposition which Mr. Smith had been suffering from for some time might speedily pass away, and that he might soon be restored to health and strength, and be able to resume the discharge of those responsible duties which had devolved upon him for more than 30 years. While they regretted Mr. Smith's absence very much, it was, he was sure, a gratification to them that they had, in the person of Mr. Samuel Milne, a most efficient substitute. Those of them who had been connected with the work of the Gas Department during the past few years, could not have failed to recognize the great ability of Mr. Milne, and the very whole-hearted and loyal way in which he had supported Mr. Smith. He should like to mention that Mr. Milne had been responsible in a very large degree for those works. It was from Mr. Milne's plans that the buildings had been erected. They had the satisfaction of knowing that in those works they had a splendidly equipped institution, which could not be surpassed anywhere in the United Kingdom; and he thought it was only right that they should recognize the very great assistance which Mr. Milne had given them in connection with the undertaking. The toast was acknowledged by Mr. J. A. Bell, the Electrical Engineer, and by Mr. Milne. Everyone, I am sure, will sympathize with Mr. Smith in his enforced idleness, which must be a great disappointment to a man of his active disposition; and we all may echo the hope that he will soon be able to return to his duties and to the post he has so long adorned.

The Leith Gas-Works were exposed for sale by auction in Dowell's Rooms in Edinburgh on Tuesday last, at the reduced upset price of £24,000. As on the previous occasion, when the price asked was £27,000, there was no offerer. It is now probable that the Gas Commissioners will endeavour to dispose of the works by private bargain, either as a whole or in lots.

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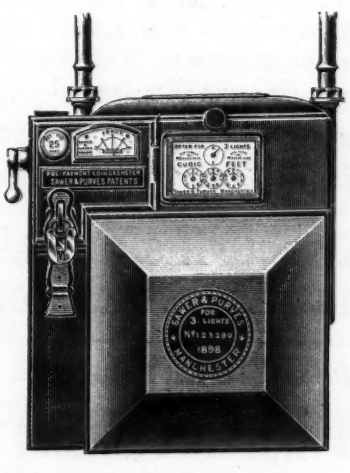

METER.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 28.

Sulphate of Ammonia.

There has again been an active market, and keen competition for all ready parcels at hardening prices, the closing quotations being £13 7s. 6d. per ton f.o.b. Hull, and £13 7s. 6d. to £13 10s. per ton f.o.b. Liverpool and Leith. For all April delivery, buyers have not been quite so keen; but sellers are looking for at least prices ruling for prompt. £12 10s. per ton having been paid for July-December f.o.b. Leith, makers advanced their ideas, but buyers have not so far responded. At the close, October-March is offered at £12 10s. f.o.b. Leith.

Nitrate of Soda.

This is firm at 9s. 3d. to 9s. 4½d. per cwt., according to quality, and a good business has been done thereat.

LONDON, *March* 28.

Tar Products.

The markets remain in about the same position as during last week; and there is very little business doing. Pitch continues quiet; and there is no actual transaction of importance to report, whether for prompt or forward delivery. In benzol, business is dull. Small sales are reported at 9d. for March-April shipment from outports; but London makers will not accept less than 9½d. In 50-90 per cent., there is really nothing doing. A small quantity of toluol is reported to have be placed f.o.b. London at 7½d. In solvent, there is no business of importance to report. Some small parcels of special quality have been sold for home consumption. Anthracene remains in about the same position; but there is rather more inquiry for forward delivery, and it is reported that one of the largest Continental consumers is now willing to entertain business all over this and next year. In crude carbolic, a large business is still being done at 1s. 6d.; but consumers will not pay over this price while there are sellers at 1s. 6½d. for April-June. Crystals seem to be in better demand; but at present the German makers are accepting the orders, being willing to take lower prices than are quoted by the English makers. Creosote is in better demand from London; several large orders for export having been taken. In the North, there is more offering, and prices are, if anything, a trifle easier.

The average values during the week were: Tar, 23s. to 28s. Pitch, London, 58s.; east coast, 55s. to 55s. 6d; west coast, 53s. to 54s. Benzol, 90 per cent., 9d. to 9½d.; 50-90 per cent., 8d. Toluol, 7d. to 7½d. Crude naphtha, 3d.; solvent naphtha, 8½d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1⅛d. to 1⅜d.; North, 1¼d. to 1$\frac{5}{16}$d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6d. Naphthalene, 35s. to 55s.; salts, 25s. to 27s. 6d Anthracene, "A" quality, 1⅛d. to 1⅜d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market continues firm; and there is difficulty in obtaining any supplies for prompt delivery, which necessarily limits business. At the moment, the Gaslight and Coke Company are not quoting in any position; but another large Company have sold for April at £13 10s., and declined to accept further business at this price. The demand from Leith continues good, and £13 10s. has been paid. Makers as a rule now ask £13 11s. 3d. to £13 12s. 6d. In Hull, business has been done at £13 5s. to £13 7s. 6d. early in the week, and makers now ask £13 10s. for prompt shipment. In Liverpool, the demand continues strong; but business is limited, owing to a scarcity of supplies.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Though there is not as yet any officially announced reduction in prices, there are significant indications that some downward move in round coals can scarcely be very long deferred. Suggestions have been put forward by important Lancashire collieries that, in view of the lower prices which during the past month have been ruling in other districts and the increasing competition of coal coming in from Yorkshire and Derbyshire—especially at prices much below those now current in Lancashire—some corresponding reduction at local collieries is advisable. Whatever the Associated Coalowners may do, it is tolerably certain that some of the large collieries outside the Association will reduce their quoted prices for the ensuing month; and taking the nominal list basis rates all through, there is undoubtedly a steady weakening tendency which has unofficially brought them below what may be termed the maximum basis. In the better qualities of round coal, suitable for house-fire purposes, business still drags slowly, with very few collieries working more than three to four days per week, and supplies more than ample to meet requirements; while stocks remain untouched, and are now likely to be held until next winter brings forward the usual increased demand. At the pit mouth, although list rates nominally are unchanged, average prices scarcely exceed 14s. 6d. to 15s. per ton for best Wigan Arley, 12s. and 12s. 6d. up to 13s. for the inferior qualities of Arley and Pemberton four-feet coals, and 10s. to 11s. for the lower descriptions of round coals. Common round coals are in moderate inland request; but with plentiful supplies, prices are barely maintained at late rates. With regard to forward contracts, buyers are still holding back; and though collieries are not as yet disposed to quote below last year's rates for gas coals, users are all expecting some further concession, and settlement of these contracts is being held in abeyance pending the possible further easing down in price. At the pit, common round coals are to be bought readily at 8s. to 8s. 3d. per ton, with some of the better qualities quoted at 8s. 6d. to 8s. 9d. The shipping trade in common round coals continues indifferent; and there are still very low quotations to secure cargoes—9s. 6d. to 9s. 9d. per ton representing about average figures for ordinary descriptions of screened steam coal delivered at the ports on the Mersey. Engine fuel, on the other hand,

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is tending steadily in a hardening direction—not because of any large demand, but owing to the restricted production of slack. In most cases, where new business is offered, collieries are stiffening their quotations quite 3d. to 6d. per ton on late rates; and at the pit the best qualities of unwashed slack are quoted from 6s. 9d. to 7s. 3d. per ton, with good medium sorts about 5s. 9d. to 6s. 3d., and common slacks only in exceptional cases obtainable under 4s. 6d. to 4s. 9d. per ton.

Northern Coal Trade.

The coal trade has been quieter, and prices are on the whole easier; the falling off in the demand for coal for the United States having made fuel more abundant, while the milder weather has materially reduced the demand for some classes. In the steam coal trade, there is a steady inquiry for this season; but it does not now give full employment to the collieries. Best Northumbrian steam coals are about 10s. per ton f.o.b., second-class steams are 8s. 9d. to 9s., and steam smalls are easier at about 5s. 6d. In the gas coal trade, the deliveries on the large contracts are well sustained, and these give fair work to the chief collieries; but the demand for quantities beyond these contracts is slow, and the price is on the whole lower. For Durham gas coals, the quotation is 8s. 3d. to about 8s. 9d. per ton f.o.b., according to quality. The renewals of the contracts for the great consumers are now near at hand; and it seems to be the general belief that the prices will be at a lower rate than those of the contracts that are running out soon. Gas coke is still from 12s. 6d. to 13s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade is still quiet, with prices rather tending downwards. This is not considered reassuring from the coalowners' point of view, when it is remembered that the Baltic season is about to begin, and that already annual contracts for gas-works are under consideration. The prices quoted are: Main 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow, ell 9s. to 9s. 9d., and splint 9s. 9d. to 10s. The shipments for the week amounted to 187,227 tons—a decrease of 753 tons upon the previous week, but an increase of 27,469 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,050,573 tons—an increase of 93,490 tons upon the same period of last year.

Metropolitan Water Board.—When giving the list of the members of this Board in the "JOURNAL" for the 17th inst. (p. 712), it was mentioned that Sir Charles Scotter, who, in his absence abroad, was elected to represent the Joint Committee of the Kingston Town Council and the Urban District Councils of adjoining parishes, had declined the honour, owing to his inability to give the necessary time and attention to the business of the Board. The Mayor of Kingston (Mr. T. Lyne) has been chosen in his place.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards placed several new issues of capital by order of Directors. The largest consisted of £5000 of 4½ per cent. preference water stock of the Swanage Gas and Water Company, which was sold at an average of £105 13s. per £100 of stock. Some new £10 (7 per cent.) ordinary shares in the Worthing Gas Company fetched an average of £14 8s. 4d. each; 637 "B" shares (£5) in the Romford Gas Company, carrying a dividend of 9 per cent. per annum from the 1st prox., were sold at an average of £8 4s. 6d. apiece; and a few "D" shares (£25) in the Dorking Gas Company, on which 5 per cent. has been paid, at par.

Torquay Gas Company.—The accounts presented at the annual meeting of the Torquay Gas Company last Tuesday showed gross receipts amounting to £32,716, and an expenditure of £25,449; leaving £7267 to be carried to the profit and loss account. Mr. W. H. Kitson, who presided, pointed out that the amount received from the sale of gas—£21,117—although £164 less than in the previous year, was a very satisfactory record; for if the price had been the same as in 1901, instead of being 3d. per 1000 cubic feet less, there would have been a gain of £316 from this source. The increased sale was upwards of 2 million cubic feet. There was a steady increase in prepayment meter consumers; and the number of stoves let on hire also increased. A reduction had been made in the charge for the maintenance of consumers' mantles from 9d. to 6d. per quarter, and the number which the Company were now maintaining was about 800. The usual dividends were declared, and the Directors and officials were complimented upon the satisfactory condition of the business.

A Magistrate's Opinion of Gas.—In the course of the hearing of a summons taken out against Peter Robinson, Limited, of Regent Street, for failing to keep certain of their workshops at a reasonable temperature, and not taking adequate measures to ensure proper ventilation, the Inspector of Factories (Miss Deane), in cross-examination, referred to the gas having been turned on, but said she believed she had been told by the defendants' Overseer that it was not lit to warm the workrooms, but to enable the girls to see better certain kinds of work they had in hand. The Magistrate (Mr. Plowden) thereupon remarked: "You don't say that gas is not an effective system of heating?" The witness replied: "I do, Sir. It gives off deleterious products." Mr. Plowden remarked that it was used for heating the Marylebone Police Court, and nobody had yet died in consequence. The Overseer was called, and said the gas was used only for lighting purposes, not for heating. In deciding the case, his Worship said it was very difficult to determine what a reasonable temperature was, as one person might like a very warm room and another a comparatively cold one. He must, however, take it, as had been suggested during the hearing, that from 60° to 65° was a reasonable temperature. The evidence was conflicting as to the gas having been used for heating purposes; but there must be a nominal penalty—20s. each on two of the summonses concerning the cold rooms, with 28s. costs, and an order to improve the warming apparatus.

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Cyanogen Recovery in Gas-Works.—It was stated at the half-yearly meeting of the Leamington Priors Gas Company last week that a contract had just been signed for the erection of a cyanide plant, and that the cyanogen to be produced from the gas for a period of ten years had been sold to the British Cyanide Company, Limited.

Visit to the Croydon Water-Works.—Last Wednesday afternoon, a party of visitors inspected the Croydon Water-Works, under the leadership of Mr. Vincent Moss, a member of the Corporation. The interest of the visit was much enhanced by the explanation of the machinery given by Mr. T. Walker, the Borough Engineer. At the close of the inspection the party were entertained by the Mayor of Croydon (Sir F. T. Edridge).

Opposition to the Sutton Water Bill.—The Croydon Rural District Council and the Carshalton and Sutton Urban District Councils have entered into an arrangement so that they will jointly oppose the Bill of the Sutton Water Company, by which they seek power to construct additional works, acquire lands, and raise more money. The chief object which the authorities mentioned have in view is to secure the purity of the supply by compelling the Company to put down some filtration plant. Another point upon which the opposition lay great stress is the present charge, which is on the gross rack rental. This is said to operate very unjustly on the consumers; and an effort is to be made to amend the Company's powers by substituting a charge upon the rateable value of the premises supplied.

San Paulo Gas Company.—With the balance of £3452 brought forward from 1901, the revenue account of this Company shows a profit on the past year's working of £26,932; and after deducting the interest on debentures and bank loan (£1619), there remains a disposable balance of £25,313. An interim dividend of 4 per cent., absorbing £10,000, was paid; and the Directors now propose to recommend the payment of a final dividend at the same rate, free of income-tax, making a total distribution for the year of 8 per cent., to transfer £2000 to the credit of the lamp conversion account, and to carry forward the balance of £3313. Respecting other than financial matters, the report states that it has been found necessary to increase the diameter of the gas-pipes in several of the districts of San Paulo, in order to improve the supply and pressure. The cost of this work will be approximately £10,000. The transformation of the public lamps from the flat-flame to the incandescent burner is proceeding with all speed; and before the end of the current year, the city will be lighted entirely on the Welsbach system. After the conversion is completed, the illuminating power of the gas will be lowered to 14 candles. The Directors reduced the price of gas to the private consumers from March 1, 1902, to the new standard price for the 14 candle gas; so that for ten months of the year, the consumers had the benefit of a price 18 per cent. below that of 1901. This concession has been greatly appreciated, and has stimulated the consumption to such an extent that in December last the gas-rentals had overtaken those of December, 1901.

Brentwood Gas Company.—At the recent meeting of this Company, the accounts for the past year showed a sum of £3264 to be dealt with. A dividend of 8 per cent. was declared, free of income-tax, £1000 was carried to the depreciation and renewals fund, and the price of gas was reduced by 2d. per 1000 cubic feet as from the 25th inst.

The Carlisle Water Scheme.—A public meeting of the owners and ratepayers of Carlisle was held in the Drill Hall last Wednesday, to consider the Geltsdale scheme. Mr. G. J. Bell moved the following resolution: "That the amount now proposed to be expended in carrying out the Geltsdale water scheme being double the sum sanctioned for that purpose, in addition to involving the ratepayers in what the Engineers themselves have described as 'the chance' of a still heavier outlay, this meeting strongly protests against any further step being taken in connection therewith until the full responsibilities of the city have been ascertained with respect to its obligations to the parties claiming under the Act, and every inquiry has been made as to the effect of the recent and friendly overtures of Lord Carlisle and the Brampton District Council to assist the Corporation in obtaining an Abandonment Act should such a course be found expedient." After considerable discussion, the resolution was carried unanimously; and it was decided to send a copy of it to the Mayor, with a request that he should call the attention of the City Council thereto at the earliest possible opportunity. The opinion of Sir Ralph Littler, K.C., has been obtained on the question of proceeding with the scheme; and, on the whole, it is opposed to this being done. He considers that the more the scheme is looked at, the more unpromising it becomes.

Gas Explosion at the Leeds Town Hall.—Apparently through some defect in the apparatus used for compressing the gas for the high-pressure lamps surrounding the Leeds Town Hall, an explosion of gas occurred last Friday morning which occasioned considerable damage in and about the hall. The compressing apparatus is situated in a basement on the Great George side of the building. The lights supplied by it were extinguished at five o'clock on Friday morning; and it is surmised that about that time something went wrong with the compressors, and that there was an escape of gas into the basement, estimated at about 1000 cubic feet. The disastrous explosion occurred soon after eight o'clock, on one of the cleaners setting light to the fire in the room overhead. Fortunately, the injuries to the woman were such that, after attention at the infirmary, it was not considered necessary to detain her there; but the damage to property is estimated at about £200. A correspondent referring to this matter says: "There is no evidence to show that the compressors were responsible for the leakage. They were working as usual up to within an hour or two of the explosion. If the leakage arose from the plant, however, it could only have been on account of parts of the apparatus having worn. The authorities were strongly advised to have the apparatus repaired some months back; but apparently instructions to do this were only given a few days before the explosion. The compressors were of a very early type, having been put in nearly four years ago by the Intensified Gaslight Company."

7½%

per annum,

To keep our Coke-Conveyors in THOROUGH WORKING ORDER, is what we will charge. This is not what it costs; but as it is lower than the actual cost on other designs of Hot-Coke Conveyors, you may be glad to accept our offer. We shall be glad if you do.

We have no need now to Advertise our Inclined Retorts in the "JOURNAL." They advertise themselves.

NEW CONVEYOR CO., LTD., SMETHWICK.

100%

is the EFFICIENCY of our Coke-Conveyor. We guarantee it to do certain work that is specified, and it does it. Not 75 per cent. or 200 per cent. It does all we say and no more. It does not break the Coke. It does not break down. Twenty-five hours' stop in Twelve Months working!

Leicester Corporation Water Supply.—At the meeting of the Leicester Town Council last Wednesday week, the Water Committee reported that the net profit on the undertaking in the six months ending the 31st of December was £10,441. Out of this a sum of £3387 had been set aside for the sinking fund; leaving a balance of £7054. This amount the Committee recommended the Council to carry to the credit of the special water fund created under section 164 of the Derwent Valley Water Act, 1899, together with the balance for the half year ending the 30th of June. The quantity of water delivered during the past year within the limits of supply was 1,815,721,950 gallons, and the average consumption of water per head of the population was 19·82 gallons, including the quantity used for trade purposes. The number of houses on the books at the end of December was 54,997; giving an estimated population of 255,093 persons.

Reductions in Price.—The St. Anne's Gas Company announce a reduction in the price of gas for lighting purposes of 1½d. per 1000 cubic feet as from the 1st prox. The gross charge will then be 4s., with a discount of 4½d., or 3s. 7½d. per 1000 cubic feet net. The charge for gas for cookers will remain at 3s. 3d. per 1000 cubic feet net. The Directors of the Guildford Gas Company announce that, as from the 1st prox., the price of gas supplied beyond a 2-mile radius from the works will be reduced from 4s. to 3s. 6d. per 1000 cubic feet net.; and within the above limit, from 3s. 2d. to 2s. 11d. In addition to this, all customers of over £100 per annum for gas used in any one establishment will be allowed a discount of 5 per cent.; and customers of over £50 and under £100 per annum, 2½ per cent. The Company have, however, found it necessary to re-establish a rental for meters; but this will be on a considerably reduced tariff as compared with that previously imposed—the charge for a 2-light meter being fixed at 9d. per quarter, and so on, according to size. The Hyde Gas Company intimate that from and after the readings of the meters for the March quarter, the price of gas will be reduced from 3s. 4d. to 3s. per 1000 cubic feet, with the following discounts for prompt payment: When the quarterly consumption is under 50,000 feet, 4d. per 1000 feet; above 50,000 and under 200,000 feet, 5d.; above 200,000 and under 500,000 feet, 6d.; and over 500,000 feet, 7d. Slot meter consumers will be allowed 25 instead of 22 cubic feet for one penny. The Directors of the St. Austell Gas Company have further reduced the price of gas, to take effect from to-morrow. The charges in future will be 3s. 6d. net per 1000 cubic feet for gas used for cooking and power purposes (with special discount for the latter), and 4s. 1d. net for lighting; being in each case 2d. less than before. Gas for lighting and cooking supplied through the same meter will cost the consumer 3s. 9d. net per 1000 cubic feet. Slot meter customers get 19 cubic feet of gas for 1d., if for lighting only, and 22 cubic feet if for cooking or both cooking and lighting. In making the announcement by means of an attractive circular, the Manager and Secretary (Mr. Harold E. Riley) shows how much a pennyworth of gas is capable of doing, and reminds the consumers that the more the Company can sell the cheaper they will be able to produce it.

Improvement and Extension of the Enfield Gas Company's Works.—The rapidly increasing sale of gas in the Enfield Gas Company's district has rendered necessary from time to time the enlargement and extension of the manufacturing plant, especially during the last two years; and the Company have now commenced the extension and re-erection of their retort plant, in order to practically double the present output. The work of reconstruction was commenced last year under the advice of the Company's Engineers (Messrs. W. A. Valon and Son); and the marked success of the new settings has determined the Directors to pull down the old ones, to enlarge the retort-house, and to reconstruct the retort beds and settings on the regenerator principle—adopting Mr. Valon's successful plan which is in use at Ramsgate and many other works. As is well known, Mr. Valon is not an advocate of sloping retorts where horizontal ones can be used. At Enfield, he has recommended the adoption of the West Gas Improvement Company's latest development in the way of stoking machinery—the combined charging and drawing machine, of which a full description recently appeared in the "JOURNAL."

The Somzée-Greyson Intensified Gaslight Company have opened a show-room at York Mansions, York Street, Westminster.

Messrs. Biggs, Wall, and Co. have received a repeat order for their retort-charging machine from the Wrexham Gas Company.

The Silsden Urban District Council have given to Messrs. Clapham Bros., Limited, of Keighley, the contract for the construction of the whole of their new gas-works at Silsden.

The Bathgate Gas Company was registered in Edinburgh last week with a capital of £12,000, in £5 shares. The public are not invited to subscribe. The capital of the present Company is £4000.

Mr. W. F. Cotton, J.P., Managing-Director of the Alliance and Dublin Consumers' Gas Company, is one of the Directors of the Shannon Water and Electric Power Company, which has been incorporated with a capital of £360,000, in £10 shares.

At the meeting of Messrs. Stewarts and Lloyds, Limited, of Glasgow and Birmingham, last Thursday, the accounts presented showed a net profit of £97,132 for the past year. Adding the balance brought forward, £50,182, there was produced a total of £147,314. After deducting the interim dividends for the half year to June 30 last, at the rate of 6 per cent. per annum on the preference and 9 per cent. per annum on the ordinary shares, amounting to £33,000, there remained a balance of £114,314, which the Directors recommended should be appropriated as follows: To depreciation account, £15,000; to reserve fund, £11,000; to payment of dividends for the half year ended Dec. 31, 1902, at the rate of 6 per cent. per annum on the preference shares, £10,500 (from which income-tax would be deducted), at the rate of 11 per cent. per annum on the ordinary shares (free of income-tax), £27,500—together, £64,000; leaving a balance to be carried forward of £50,314.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT, MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000		

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CANVASSERS. No. 4012.
CANVASSERS. No. 4015.
COLLECTING CLERK. Broadstairs Gas Company. April 18.
COLLECTOR AND INSPECTOR. No. 4011. April 11.
DRAUGHTSMEN. Cutler and Sons, Millwall.
DRAUGHTSMEN. W. J. Jenkins and Co., Retford.
FITTER. Dorking Gas-Works.
GAS AND WATER MANAGER. Hindley Corporation. April 2.
GENERAL FOREMAN. Hertford Gas Company.
INTERVIEWERS AND CANVASSERS. No. 4013.
OUTDOOR INSPECTOR. Nottingham Gas Department. April 21.
WORKING MANAGER. Larne Gas Company.

Situations Wanted.

MAIN AND SERVICE LAYER, &c. No. 4014.
RATE CLERK OR ASSISTANT RATE COLLECTOR. No. 4009.
TRAVELLER GAS-STOVE TRADE. W. W., Faversham.

Plant, &c. (Second-Hand) for Sale.

CONDENSER. Redditch Gas-Works.
HYDRAULIC MAIN, VALVES, &c. Bridport Gas Company.
STATION GOVERNORS, VALVES, &c. Gas-Works, Sutton.
TOWER SCRUBBER, &c. Cambuslang Gas-Works.

Plant (Second-Hand) Wanted.

ENGINE AND EXHAUSTER. British Cyanides Company, Oldbury.
PURIFIER AND EXHAUSTER, &c. No. 4000.

Sales of Stocks and Shares.

READING GAS COMPANY. April 9.
SOUTH ESSEX WATER-WORKS COMPANY. April 21.
TONBRIDGE GAS COMPANY. April 21.
YORK UNITED GAS LIGHT COMPANY. April 27.

Mortgage Bonds.

SOUTH SHIELDS GAS COMPANY.

TENDERS FOR

Coal and Cannel.

EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.
LOUTH GAS COMPANY. Tenders by April 10.

Engine, Boiler, and Exhauster.

BURNHAM GAS COMPANY. Tenders by April 14.

Fire-Clay Goods.

EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.

Gasholder.

STRANRAER GAS COMPANY. Tenders by April 9.

General Stores, Tools, &c.

EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.

Governor.

BURNHAM GAS COMPANY. Tenders by April 14.

Hot-Coke Conveyor.

COLNE GAS DEPARTMENT. Tenders by April 18.

Incandescent Street Lamps.

GLASTONBURY GAS DEPARTMENT. Tenders by April 18.

Lime.

EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.

Meters.

BURNHAM GAS COMPANY. Tenders by April 14.
EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.

Pipes and Fittings, &c.

BURNHAM GAS COMPANY. Tenders by April 14.
EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.
STOCKPORT GAS DEPARTMENT. Tenders by April 15.

Retort Bench and Fittings, &c.

RAMSGATE GAS DEPARTMENT. Tenders by April 11.

Retorts.

EDINBURGH AND LEITH COMMISSIONERS. Tenders by April 21.

Steel Joists, &c.

RAMSGATE GAS DEPARTMENT. Tenders by April 11.

Sulphuric Acid.

BURY GAS DEPARTMENT. Tenders by April 20.

Tar-Extractor.

BURNHAM GAS COMPANY. Tenders by April 14.

Valves, Gauges, Brass Fittings, &c.

BURNHAM GAS COMPANY. Tenders by April 14.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined.
SPENT OXIDE purchased in any district.
JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.
General Manager for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 98-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY. London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

LETTERS and Communications for Mr. R. G. HOWELL, Secretary of the Wellington (N.Z.) Gas Company, Limited (whose visit to this country was noticed in the "JOURNAL" last week), MAY BE ADDRESSED to him at the Offices of Messrs. JOHN TERRY and Co. (the Agents of the Company), 7, Great Winchester Street, LONDON, E.C.

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

FITTERS and Meter Inspectors are THANKED for their applications. Appointments have been made.
GAS-WORKS, LONG EATON.

SITUATION Wanted by Advertiser (Age 21) as MAIN and SERVICE LAYER. Well up in Meter Fixing, and detecting Leaks.
Address No. 4014, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A YOUNG Man (Age 21) seeks Situation (in or near London preferred) as RATE CLERK or ASSISTANT to RATE COLLECTOR. Has had Five Years' Experience in a Provincial Water Company.
Address No. 4009, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COAL GAS TAR wanted.
Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding-Scale Basis.
State Quantity to offer for Prompt and Forward Delivery.
The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE CEMENT, PAINT, GAS COAL.
BALE & CHURCH, 5, CROOKED LANE, LONDON, E.C.

WANTED, immediately, Draughtsmen used to Elevating and Conveying Plants.
Apply to W. J. JENKINS & Co., LIMITED, Gas Engineers, RETFORD.

WANTED, at once, Fitter for Prepay- ment Work. Wages 30s. per week. Three months' work certain.
Apply, by letter, to the Gas-Works, DORKING.

WANTED, Gas-Cooker Canvassers, May and June, by First-Class Makers.
Apply, stating Age, Experience, and Terms, to No. 4012, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, experienced CANVASSERS for Gas-Cookers. Exceptional opportunity for good men. Salary and Commission.
Address No. 4015, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRAVELLER, with good connection in South Eastern Counties, lately representing good Firm, desires re-engagement. Excellent References. Age 27.
Address W. W., 83, Preston Street, FAVERSHAM.

INTERVIEWERS AND CANVASSERS.
WANTED, experienced Young Men for this work. Must have excellent References. Permanent Situation for good Men.
Apply, by letter, to No. 4013, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMEN required, well up in Working Drawings of Structural Steel Work, and also for Coal-Conveying Plant. Permanent berth for satisfactory men.
State Age, Experience, References, and Salary required, to S. CUTLER AND SONS, Engineering Works, Millwall, LONDON, E.

YOUNG Man wanted at Midsummer next, as COLLECTOR and INSPECTOR at a small Gas-Works near London. Must have sufficient knowledge of Stoves and Incandescent Burners to be able to advise Consumers and report clearly on cause of complaints.
Commencing Salary £80 per annum.
Applications, enclosing *copies* only of Two Testimonials, to be sent in, on or before April 11 next, to No. 4011, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GENERAL Foreman wanted for the Hertford Gas-Works. Must be absolutely reliable, Trustworthy, and accustomed to gas-works' routine. A good Carbonizer, and one with a Mechanical Knowledge preferred. Wages 35s. per week.
Apply, stating Experience and giving two References, to Mr. DUESBURY, Gas-Works, HERTFORD.

THE Larne Gas Company, Limited, want a thoroughly practical Man as WORKING MANAGER of their Works. Must be a good Carbonizer, able to read Meters, and experienced in working on the Regenerative System. Annual make about 12 Millions. State where last employed, and Salary expected.
Applications, with *copies* of Testimonials, to be addressed to ROBERT N. CARSON, Secretary, Station Road, LARNE.

WANTED, an Outdoor Inspector expe- rienced in up-to-date methods of High and Low Pressure Incandescent Lighting, Internal Gas-Fitting, and capable of advising Consumers in all matters relating to the Supply and Distribution of Gas. To also take charge of an Incandescent Mantle and Burner Maintenance Department about to be commenced. None but experienced and capable men need apply.
Applications, stating Age, Experience, and Salary required, accompanied by *copies only* of three recent testimonials, to be sent in not later than April 21, 1903.
J. H. BROWN,
Engineer and Manager.
City Gas Offices,
6, George Street, Nottingham.

BROADSTAIRS GAS COMPANY.

WANTED, by the above Company, a Person to act as COLLECTING CLERK. The person appointed must devote his whole time to the service of the Company, and reside in Broadstairs.
Salary, £100 per annum. Satisfactory Guarantee required; the Premium will be paid by the Company.
Applications, in the handwriting of the Candidate, stating Age, present and previous Occupation, and accompanied by *copies* of recent Testimonials (which will not be returned), to be sent to my Office, addressed to the Chairman of the Company, not later than Saturday, the 18th day of April, 1903.
F. HIGGINSON,
Secretary.
Gas Offices, Broadstairs,
March 25, 1903.

URBAN DISTRICT COUNCIL OF HINDLEY.

APPOINTMENT OF GAS AND WATER MANAGER.

THE above Council invite Applications for the position of GAS and WATER MANAGER. Salary £180 per annum. Candidates must have had experience in the management of Men, and be fully competent to take charge of the Works.
The person appointed will have the sole control of the Gas and Water Works of the Council, and will have to reside in the district of Hindley. Three months' notice to be given or taken to terminate the engagement.
Written applications, stating Age, where at present Engaged, and Experience, accompanied by not more than Three recent Testimonials, to be forwarded to the undersigned not later than Thursday, the 2nd day of April, 1903, endorsed "Application as Gas and Water Manager."
Canvassing members of the Council, either directly or indirectly, will be deemed a disqualification.
THOMAS ROBEY,
Clerk of the Council.
Council Offices, Hindley,
March, 1903.

GAS-METERS wanted, old disused Wet. Copper Lamp Frames, Brass, Pewter, Tin, Zinc, Lead Ashes, Old Copper Electric Cable, &c., for Cash.
J. SMITH, Canal Road, BRADFORD.

WANTED, a Good Second-hand Gas- EXHAUSTER and ENGINE combined, capable of delivering from 2000 to 5000 cubic feet per hour against a pressure of 4 inches of water.
Quote lowest Price, and how soon same could be delivered, to THE BRITISH CYANIDES COMPANY, LIMITED, Oldbury, near BIRMINGHAM.

WANTED, a Second-Hand Purifier, 10 ft. square by 4 ft. 6 in. or 5 ft. deep, in good condition, with Valves and Connections; also a good Second-Hand EXHAUSTER, capable of passing 10,000 cubic feet per hour. Prices must be moderate.
Address, with full Particulars, No. 4000, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SCRUBBER FOR SALE.

SPLENDID 8 feet by 60 feet Tower SCRUBBER by Walker for immediate SALE. Erected complete. New Distributor, Wood Boards, &c.
J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

TOWER Scrubber for Sale. In first class condition. 5 ft. by 30 ft., 10-inch Inlet, Outlet, and Bye-Pass Valves, with Connections. Can be seen at Works.
Offers to be sent to ROBERT SIMPSON, Manager, Gas-Works, CAMBUSLANG, N.B.

FOR SALE—Very good Gas Plant as under:—
PURIFIERS—Four 12 feet square, with 8-inch Centre-Valve and Connections. Planed Joints.
Kirkham WASHER-SCRUBBER, 300,000 cubic feet per diem., with Engine and 8-inch Valves and Connections.
Livesey WASHER, 250,000 cubic feet per diem, with 8-inch Valves and Connections.
Photos. sent on application to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

PHOTOMETER.

FOR SALE—A Standard Letheby PHOTOMETER, by Alexander Wright and Co. Complete with Candle-Balance, Minute Clock, &c. Quite new.
Apply MANAGER, Gas-Works, Wallingford, BERKS.

A BARGAIN—Water-Cooled Condenser in perfect condition. Capacity 250,000 cubic feet per 24 Hours.
Address A. E. LAYTON, Gas-Works, REDDITCH.

FOR SALE—Two 8-inch Station GOVERNORS, with Valves, Connections, and Bye-Passes complete. Good condition. Can be seen at the Gas-Works, Reigate.
Offers to be sent to GEO. M. ROBINS, Engineer to the Company, at the Gas Offices, Sutton, SURREY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, Cheap, Four Capital lengths of Wrought-Iron HYDRAULIC MAIN, with Valves, Arch, and Dip Pipes, all in perfect Condition:
SIZES OF HYDRAULICS, ALL INSIDE DIMENSIONS.
18 in. by 18 in. by 9 ft. 6 in. long, ⊃, for Fives or Sixes, 8-inch Valve.
16 in. by 16 in. by 9 ft. 6 in. long, ⊃, for Fives, 8-inch Valve.
16 in. by 16 in. by 9 ft. long, ⊃, for Fives, 8-inch Valve.
16 in. by 16 in. by 8 ft. 9 in. long, ⊃, for Fives, 8-inch Valve.
Also Ash-Pans, Buckstays, Fire-Bars, &c., from Four Beds of Retorts dismantled.
For further Particulars, apply to J. H. CORNISH, Gas-Works, Bridport, DORSET.

GAS Plant for Sale, guaranteed per- fect—
RETORT IRONWORK, modern and various.
BOILER, Cornish, 4 ft. 6 in. by 14 ft. 6 in., 70 lbs.
CONDENSERS, 4-inch, 6-inch, and 8-inch, and Patent types.
EXHAUSTERS and ENGINES in duplicate up to 12-inch Connections.
"LIVESEY" WASHERS up to 10-in. Connections.
"HOLMES" WASHERS, 10-inch or 12-inch Connections.
PURIFIERS, several Sets up to 20 feet square.
METERS and GOVERNORS, 4-in. to 12-in. sizes.
GASHOLDERS, 7000, 9000, 25,000, & 30,000 capacity.
All Plant supplied guaranteed good, sound, and satisfactorily erected. Catalogues of New Apparatus and References an application.
J.F.B. & Co. are the largest buyers of discarded Gas Apparatus.
J. FIRTH BLAKELEY & Co., Gas Engineers and Contractors, Thornhill, DEWSBURY.

THE Directors of the Burnham (Somer- set) Gas Company invite TENDERS for the following NEW PLANT—viz.:
1.—ENGINE and EXHAUSTER, coupled together.
2.—TAR-EXTRACTOR, 9-inch Valve and Pressure Gauge.
3.—Egg-End STEAM-BOILER and all Mountings.
4.—9-inch Yard MAINS and SPECIALS and HOLDER VALVES.
5.—STATION METER and VALVES and PRESSURE GAUGE.
6.—STATION GOVERNOR and PRESSURE GAUGES and VALVES.
7.—About 400 Yards of 9-inch Cast-Iron MAIN PIPE and SPECIALS.
The Drawings and Specification may be seen, and any further Particulars obtained, from J. H. Cornish, Gas-Works, Bridport, Dorset.
The Directors do not bind themselves to accept the lowest Offer, and reserve to themselves the right of accepting the whole or any portion of Tenders sent in.
Tenders, endorsed "Contract No. 4," are to be delivered on or before April 14, 1903, to J. Cox, Esq., Secretary, Gas Company, Alexandra Terrace, Burnham, SOMERSET.

COUNTY BOROUGH OF STOCKPORT.
(GAS AND ELECTRICITY DEPARTMENT.)

TO IRONFOUNDERS, &c.

THE Gas and Electricity Committee are prepared to receive TENDERS for the supply of 5000 Yards of 3-inch Spigot and Socket CAST-IRON PIPES, weight not to exceed 1 cwt. 0 qr. 2 lbs. per pipe of 9 feet long; 1000 Yards of 4-inch Spigot and Socket CAST-IRON PIPES, weight not to exceed 1 cwt. 0 qrs. 26 lbs. per pipe of 9 feet long; 1000 Yards of 8-inch Spigot and Socket CAST-IRON PIPES not to exceed 3 cwt. 2 qr. 0 lbs. per pipe of 9 feet long; and also IRREGULARS, 3, 4, 6, and 8 inch.
Specification and Particulars can be obtained on application to the Engineer, Mr. S. Meunier.
Tenders, endorsed "Mains," must be addressed to the Chairman of the Gas and Electricity Committee, Portwood, Stockport, not later than Wednesday, April 15 next ensuing; and the Committee do not bind themselves to accept the lowest or any Tender.
No Tender will be accepted without satisfactory proof that the firm tendering pays the Trade Union Rate of Wages, and observe the Trade Union number of hours as are usually paid and observed in the district where the goods are made or produced.
By order,
ROBERT HYDE,
Town Clerk.
March 24, 1903.

BOROUGH OF COLNE.

THE Gas Committee invite Tenders for the supply and erection complete of a HOT-COKE CONVEYOR at their Gas-Works, Knotts Lane, Colne.
Plans can be inspected on and after March 25 next; and any further Particulars can be obtained from the undersigned.
Tenders, endorsed "Conveyor," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knotts Lane, Colne, and delivered not later than April 18, 1903.
FRED THORPE,
Engineer and Manager.
Gas-Works, Colne,
Lancashire, March 20, 1903.

GLASTONBURY CORPORATION.
(GAS DEPARTMENT.)

INCANDESCENT STREET-LAMPS.

THE Gas Committee invite Tenders for the supply of upwards of 50 14-inch INCANDESCENT STREET LAMPS, made of copper throughout, fitted up with incandescent burners (without bye-pass), with Anti-Vibrator and Governor to consume 4 cubic feet per hour; also wrought-iron chair. Other approved forms of Incandescent Lamps may be considered.
The lamps to be of the best workmanship and finish.
Form of Tender may be obtained from the undersigned.
The lowest or any Tender not necessarily accepted.
Tenders to be sent in not later than April 18, 1903, addressed to A. W. T. Baily, Esq., Chairman of the Gas Committee, and endorsed "Tender for Lamps."
D. E. GARLICK,
Manager and Secretary.

BOROUGH OF RAMSGATE.
(GAS DEPARTMENT.)

THE Gas and Water Committee desire TENDERS for the following work—viz.:
CONTRACT No. 1.—For rebuilding a RETORT-BENCH of 14 Arches, exclusive of Settings.
CONTRACT No. 2.—For the supply and part erection of RETORT-FITTINGS, HYDRAULIC MAINS, SELF-SEALING MOUTHPIECES, STEEL JOISTS, &c., &c.
Specifications, with Forms of Tender and Schedules of Quantities, may be obtained on application to the undersigned, and Prints of the Drawings will be supplied, if desired, upon payment of £1 1s., which will not be returned.
Tenders, sealed and endorsed "Retort Benchwork, Contract No. 1, or No. 2" (as the case may be), to be addressed to the Chairman of the Gas and Water Committee, Gas and Water Offices, Boundary Road, Ramsgate, on or before Saturday, April 11, 1903.
The Committee do not bind themselves to accept the lowest or any Tender.
T. N. RITSON, Assoc.M.Inst.C.E.,
Engineer and Manager.
Offices: Boundary Road,
Ramsgate, March 25, 1903.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GAS COAL AND CANNEL.

THE Commissioners are prepared to receive TENDERS for the supply of about 180,000 Tons of GAS COAL and CANNEL for delivery at their Edinburgh, Leith, and Granton Works over a period of Twelve Months.
The Contractors must guarantee that in the execution of their Contracts they will pay the Standard Rate of Wages, or such Wages as are generally recognized as fair in their business.
Further Particulars, Schedule, and Form of Tender may be obtained on application to the Chief Engineer, Mr. W. R. Herring, at the Gas-Works, New Street.
Tenders to be lodged by Ten o'clock on Tuesday forenoon, the 21st prox., in sealed envelopes, marked "Tender for Coal," and addressed to the undersigned.
The Commissioners are not to be bound to accept the lowest or any offer.
JAMES M'G. JACK,
Clerk.
25, Waterloo Place,
Edinburgh, March 27, 1903.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

STORES.

THE Commissioners invite Tenders for the supply of:—

LIME.	FIRE-CLAY BRICKS and RETORTS.
OILS and PAINTS.	YARN, &c.
TIMBER.	IRON, STEEL, and IMPLEMENTS.
METERS.	IRON CASTINGS, &c., &c.
GAS-FITTERS' STORES.	CAUSEWAY REPAIRS.
WROUGHT-IRON TUBES and FITTINGS.	
CAST-IRON PIPES and CONNECTIONS.	

Required for their various Undertakings during the Year from Whitsunday first.
The Contractors must guarantee that in the execution of their Contracts they will pay the Standard Rate of Wages, or such Wages as are generally recognized as fair in their business.
Tender Forms and all Information can be had on application to the Chief Engineer and Manager, at the Gas-Works, New Street.
Offers must be lodged not later than Ten o'clock on Tuesday forenoon, the 21st prox., in sealed envelopes, addressed to the undersigned, and marked "Tender for Lime," or as the case may be.
The Commissioners are not to be bound to accept the lowest or any Tender.
JAMES M'G. JACK,
Clerk.
25, Waterloo Place,
Edinburgh, March 27, 1903.

COUNTY BOROUGH OF BURY.

TO SULPHURIC ACID MAKERS.

THE Gas Committee are prepared to receive TENDERS for the supply of about 400 Tons of SULPHURIC ACID for the manufacture of Sulphate of Ammonia for a period of One Year from the 1st of May, 1903.

Forms of Tender and Conditions may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Sealed Tenders, endorsed "Tender for Acid," to be sent to the undersigned on or before Monday, the 20th day of April, 1903.

JOHN HASLAM,
Town Clerk.

Bank Street, Bury,
March 27, 1903.

TENDERS FOR GAS COAL.

THE Directors of the Louth Gaslight Company invite TENDERS for the supply of 4000 Tons (more or less in varieties) of GAS COAL and GAS SLACK required at their Works during a period of One Year.

Forms of Tender, with Specification, may be obtained on application to the undersigned, Secretary of the Company.

Sealed Tenders, endorsed "Tenders for Coal," addressed to the Chairman of the General Purposes Committee of the Louth Gaslight Company, to be sent to the undersigned on or before the 10th of April, 1903.

The Directors do not bind themselves to accept the lowest or any Tender.

PHILIP ALLISON,
Secretary.

Louth Gaslight Company,
Louth, Lincolnshire, March 24, 1903.

READING GAS COMPANY.

ISSUE OF DEBENTURE STOCK BY TENDER.

NOTICE is Hereby Given, that the Reading Gas Company Offer for SALE BY TENDER £14,344 FOUR PER CENT. DEBENTURE STOCK, being a portion of the Additional Capital Authorized to be raised under the Reading Gas Act, 1902; and the Directors will be prepared to receive sealed Tenders, not later than Twelve o'clock noon, on Thursday, the 9th day of April, 1903.

By the Trustee Act, 1893, it is provided that a Trustee having power to invest in the Mortgages or Bonds of a Company may, unless the contrary is expressed in the instrument authorizing the investment, invest in the Debenture Stock of such Company.

Particulars and Conditions of Sale, with printed Form of Tender, can be obtained on application to the Secretary.

By order,
ARTHUR H. CANE,
Secretary.

7, King Street, Reading,
March 10, 1903.

STRANRAER GASLIGHT COMPANY.

THE Directors of the Stranraer Gas Company invite TENDERS for the erection of a SINGLE-LIFT GASHOLDER (prepared for Telescoping) at their Works.

Plans may be inspected, and copies of Specification can be had, on application to the Manager at the Works, Harbor Street.

Tenders to be addressed to W. G. Belford, Esq., Dunbar House, Stranraer, not later than the 9th of April, 1903.

Gas-Works, Harbor Street.,
March 27, 1903.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 3000 £10 NEW ORDINARY FIVE PER CENT. MAXIMUM SHARES.

MR. ALFRED RICHARDS will sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, April 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

TONBRIDGE GAS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SOUTH SHIELDS GAS COMPANY.

ISSUE OF 3½ PER CENT. MORTGAGE BONDS.

THE Directors are prepared to receive APPLICATIONS for £10,000 MORTGAGE BONDS, at the above rate, less income-tax, in multiples of £100, for a term of not less than Three Years, repayable at any time after that period by a Six Months' Notice on either side.

Interest payable Half Yearly, on the 30th of June and the 31st of December in each year.

Applications will be accepted in the order in which they are received.

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, March, 1903.

YORK UNITED GASLIGHT COMPANY.

SALE BY TENDER OF PREFERENCE STOCK,

Under the Provisions of the York United Gaslight Company's Act, 1898.

NOTICE is Hereby Given, that, in pursuance of a Resolution passed at a Meeting of the Company specially convened for the purpose and held on the 26th day of March, 1903, it is the intention of the Directors to SELL BY TENDER £40,000 PREFERENCE STOCK, entitled to a Maximum Preferential Dividend of £4 per cent. per annum, and to be paid up in full on or before the 20th day of May, 1903; being a portion of the Additional Capital authorized to be raised under the above-named Act.

Particulars and Conditions of Tender may be obtained on application at the Gas Company's Office, Davygate, York, or at the York City and County Bank, or any of its Branches; and sealed Tenders, marked "Tender for York Gas Stock," must be lodged with the Gas Company, Davygate, York, or with the York City and County Banking Company, Limited, York, or any of its Branches, not later than Ten o'clock a.m. on Monday, the 27th of April, 1903.

By order,
MATTHEW LEAF,
Secretary.

Gas Offices, Davygate,
York, March 27, 1903.

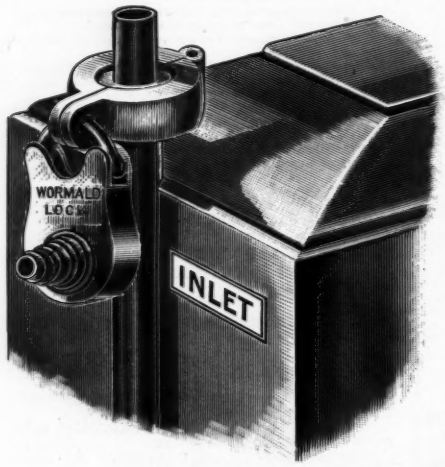
ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

GREEN'S METER CLIP.



This is the Meter Clip referred to recently by Mr. Green, of Preston, in the Correspondence Columns of the "Journal of Gas Lighting."

It is a perfect safeguard for protecting a meter's couplings from unauthorized interference for any purpose whatsoever.

MADE BY

ALDER & MACKAY,

GAS METER MAKERS,

EDINBURGH, BRADFORD, & LONDON.

It would be easy to attain 500-candle power per foot of Gas—on paper in advertisements, but we prefer to appeal to scientific knowledge—not trade upon ignorance, and

ENGINEERS KNOW

THAT PERFECT COMBUSTION MEANS HIGH EFFICIENCY.

THAT PERFECT COMBUSTION OF COAL GAS REQUIRES CORRECT PROPORTIONS OF GAS AND AIR.

THAT CORRECT PROPORTION TO SUIT ANY MAKE OF GAS CAN BE BEST OBTAINED BY ADJUSTMENT, WHICH IS MOST READILY AND ACCURATELY MADE IF BOTH AIR AND GAS ARE SUPPLIED AT CONVENIENT PRESSURES.

THAT AMPLE SUPPLY OF BOTH ELEMENTS OF COMBUSTION UNDER PRESSURE ENABLES ANY POWER OF LIGHT TO BE ATTAINED.

ALL THESE ADVANTAGES ARE EMBODIED IN THE SCOTT-SNELL LAMP.

GAS COMPANIES

Feel the competition of Electric Lighting.

Should know that the public has been, by arc lighting, educated up to requiring better illumination in main thoroughfares than the present small unit lights.

OFFICIALS

Know that their duty is to earn dividends, not to maintain opinions.

An official may believe in small unit lights, but this won't console Shareholders when they see all the main street lighting swept away, and arc lights installed, because the public cannot otherwise get what they demand—big lights.

GAS SHAREHOLDERS

Are none the happier because all the great business emporiums install electric arc lights. Big lights mean big business. Business men know this, and they don't work for philanthropic purposes—it pays.

FINANCIERS

Smile to see the ease with which projects for large electric lighting schemes can be brought forward, and have interest secured, because of the big lights, whilst gas people are cavilling about decimals of a foot in the gas consumption of small burners.

DON'T YOU SEE

As long as you light main streets with small lights that there are so many required, the Authorities are necessarily particular to keep down the consumption per lamp.

DON'T YOU KNOW

That small lights have less efficiency, about half the light per foot of gas given by the large Scott-Snell lights. Why waste your possibilities?

HAVE YOU NOT PERCEIVED

The wisdom of the Electrical people in giving up small power Incandescent Electric Lamps for street lighting. Some advocates of even these small lights exist—in the Workhouse.

FOR EXACT INFORMATION

About our system write or call, and bring along your prejudices and objections, if you have any.

THE SCOTT-SNELL SELF-INTENSIFYING GAS-LAMP CO., LTD.,

53, Victoria Street,

London, S.W.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

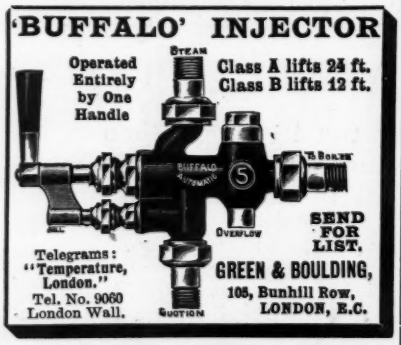
MIRFIELD (GAS-COAL) COLLIERY COMPY
RAVENSTHORPE, NEAR DEWSBURY.

THE
"ROTARY"
STATION METER.

Efficiency
Demonstrated.

APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

'BUFFALO' INJECTOR



HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

JOHN HALL & CO.,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

LONDON OFFICE
181
QUEEN VICTORIA ST.
E. C.

DRAKES
HORIZONTAL
AND
INCLINED
RETORT SETTINGS
WITH
GENERATOR
AND
RECUPERATOR
FURNACES

LIMITED

CONTRACTORS
FOR
EVERY KIND
OF
GASWORKS
PLANT.
ELEVATORS
AND
CONVEYORS

HALIFAX
AND
LEEDS

GREAT SAVING IN FUEL

"A VERY SIMPLE & INGENIOUS APPARATUS."—
VIDE "THE ENGINEER" NOV 12TH 1897
SOLE LICENSEES:
WALLACH BROTHERS.
57 GRACECHURCH ST LONDON.E.C.

The "Evertrusty" Draught Indicator, also known as Jensen's Flutometer (Regd. Trade Mark), Should be fixed to every boiler flue, coke-oven, retort, &c., to reduce your Coal Bill. Clear indication of variation of draught pressure obtained. Agents Wanted.

COKE-BREAKERS

For Hand or Power. On Tooth-cutter or Jaw Principles
Goodwin Barsby & Co., Engineers and Ironfounders, Leicester.

THE PATENT
"BEACON" GLOBE LAMP.

Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

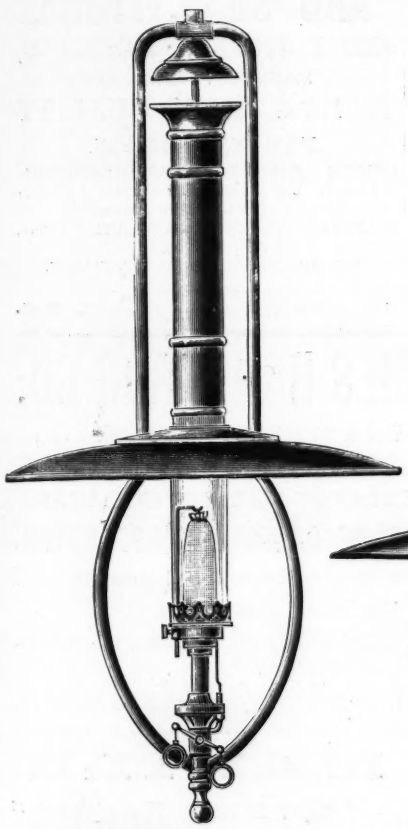
H. GREENE & SONS, Limited,
Surrey Engineering Works,
Blackfriars Road, LONDON.
[Telephone 1693 HOP.
Telegrams: "LUMINOSITY LONDON."

"VERITAS"

SELF-INTENSIFYING GAS-LAMPS

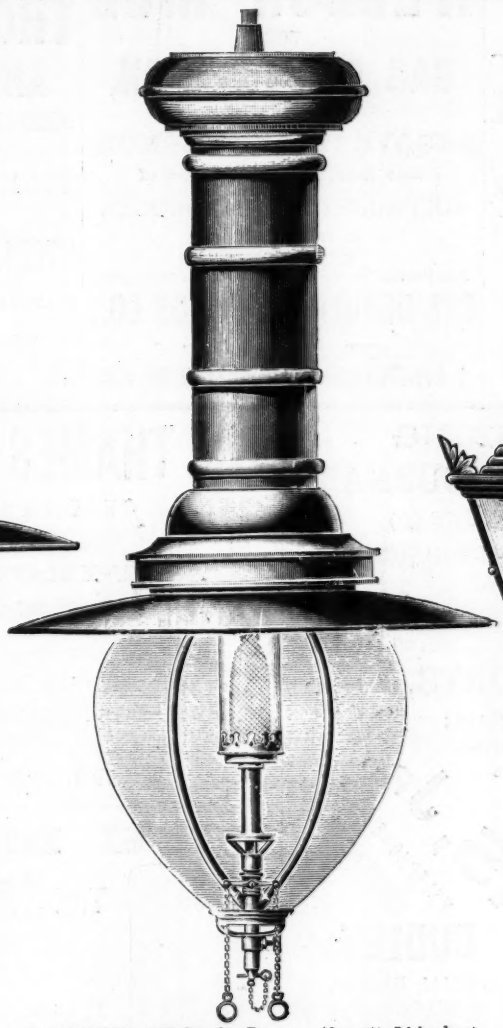
FOR OUTDOOR AND INDOOR LIGHTING.

EQUALLING THE ELECTRIC ARC AT $\frac{1}{3}$ ITS COST.



G 46346/III.
500-Candle Power.
(Length 51 inches).
90s. each.

G46344/II.
350-Candle Power.
(Length 39 inches).
66s. each.



G 46350/III. 500-Candle Power. (Length 53 inches).
200s. each.

G 46348/II. 350 Candle Power. (Length 46 inches).
110s. each.

G 46354/III.
500-Candle Power
STREET LANTERN.
Cast-Iron Frame and Enamelled Top
(Height 56 inches).
200s. each.

PRICES SUBJECT TO OUR USUAL TRADE DISCOUNT

List No. 162 forwarded on application.

FALK, STADELMANN, & CO., LD.

"VERITAS" LAMP WORKS,

83, 85, & 87, FARRINGDON ROAD, LONDON, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

THE
PETROLEUM GAS SYNDICATE
Are prepared to erect Installations from 50 to 2000 Lights of their
Petrogene Patent Carburetting Plant
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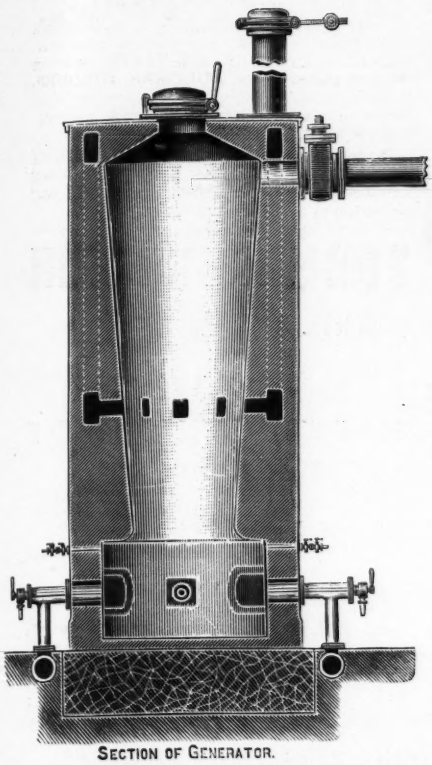

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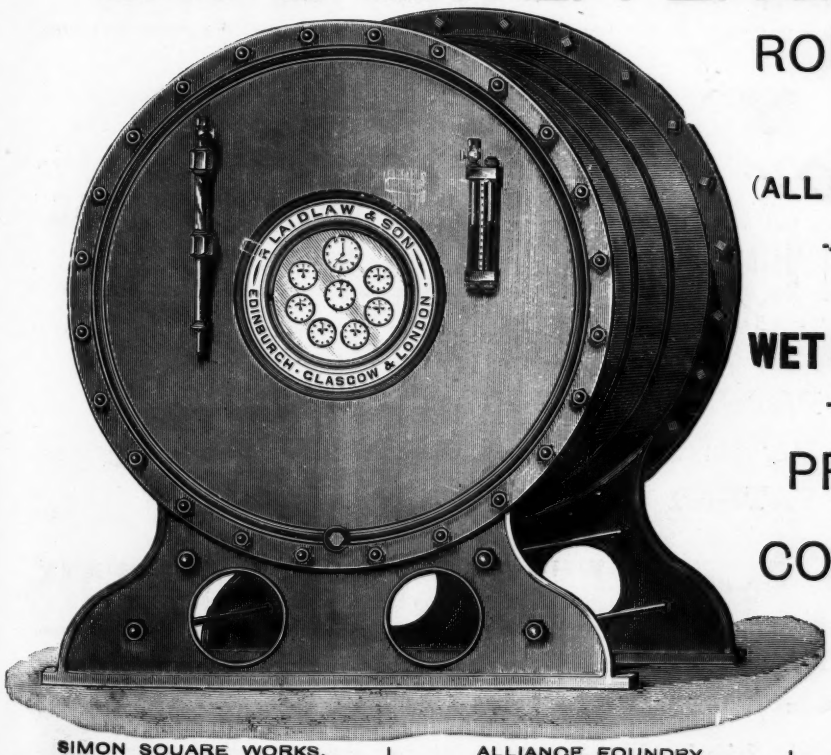

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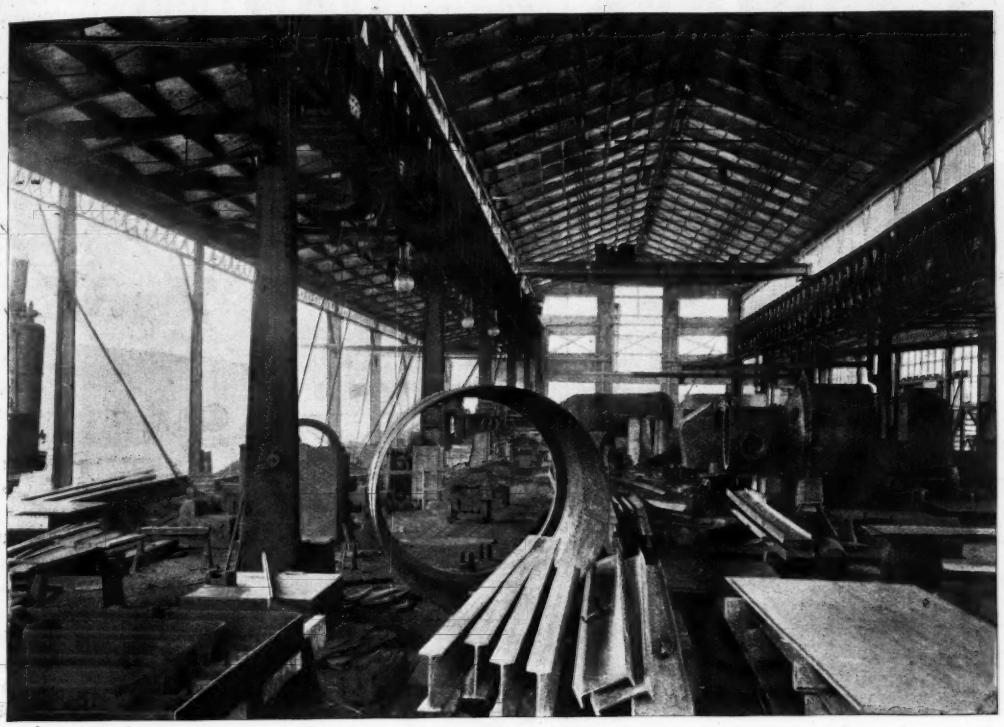

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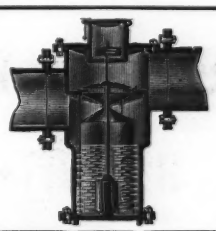

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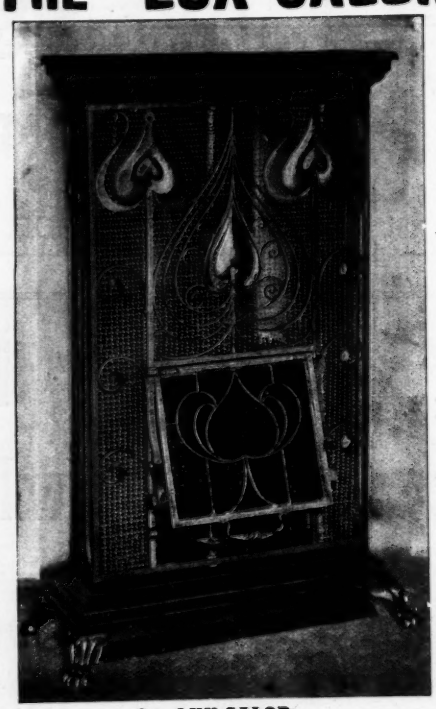

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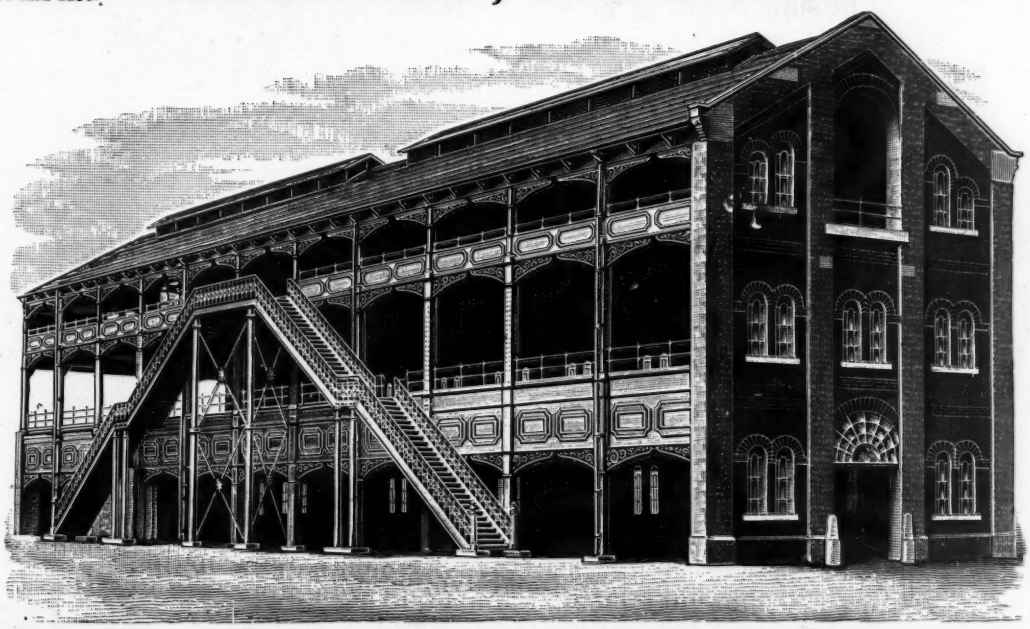

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THE JOURNAL OF GAS LIGHTING
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[REGISTERED AS A NEWSPAPER

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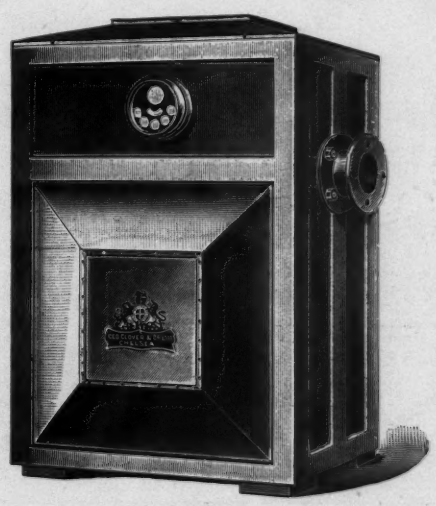
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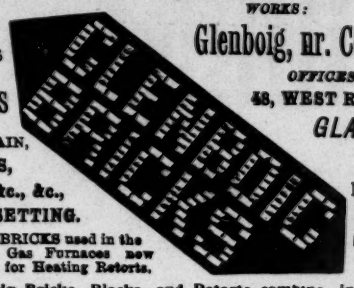

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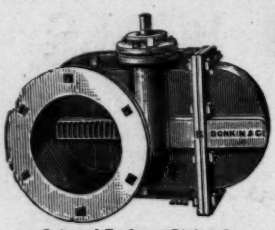

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Internal Worm and Rack Valve and Column. Fig. 33.

Internal Rack and Pinion Valve and Column. Fig. 20.

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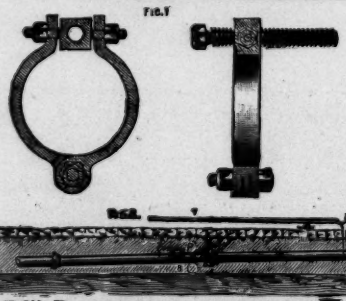

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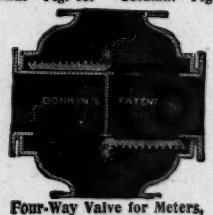

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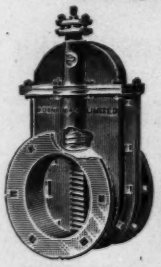

Worm and Rack Valve. Fig. 26. C.19c.

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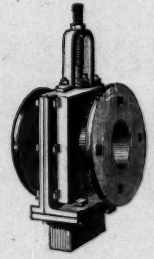
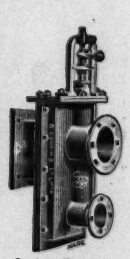


Hydraulic Main Seal Regulating Valve. Fig. 24.



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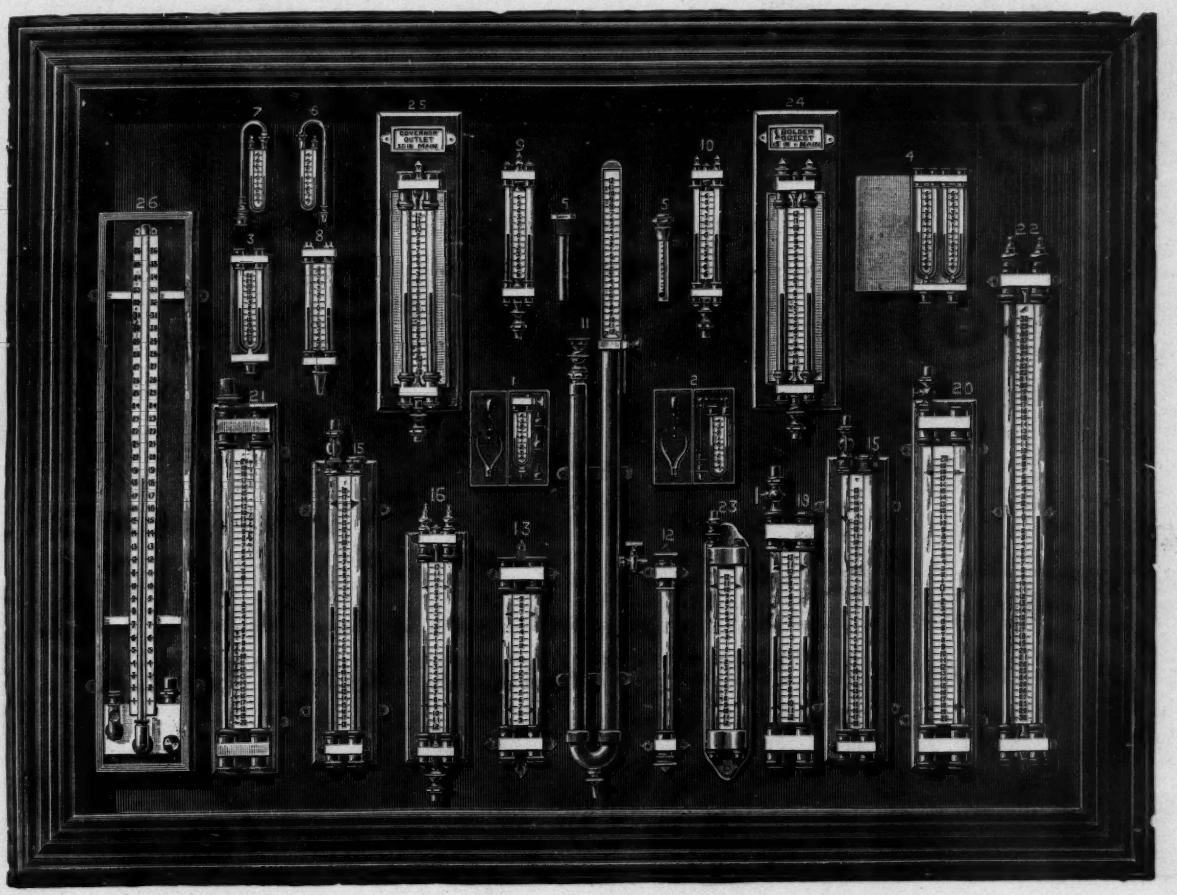

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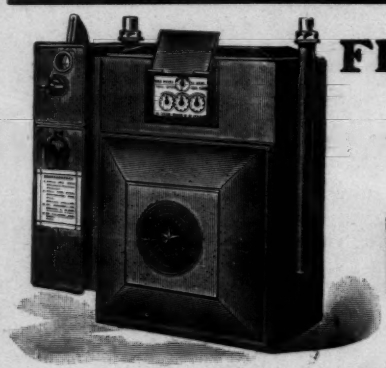

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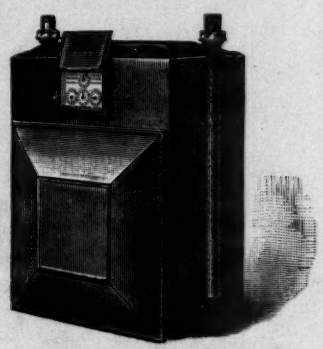

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